ENVIRONMENTAL ASSESSMENT AND
FINDING OF NO SIGNIFICANT IMPACT

Roaring River

Environmental Assessment Number OR080-03-06
Tract Number 03_503

March 2003

United States Department of the Interior
Bureau of Land Management
Oregon State Office
Salem District
Cascades Resource Area
Linn County, Oregon

Responsible Agency:	USDI - Bureau of Land Management
Responsible Official:	Brad Keller, Acting Field Manager Cascades Resource Area 1717 Fabry Road SE Salem, OR 97306 (503) 375-5968
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Abstract: This environmental assessment discloses the predicted environmental effects of one action alternative and one no action alternative for federal land located in Township 11 South, Range 1 East, Section 1, Willamette Meridian; and within the Crabtree Creek Watershed. Alternative 2 is the proposed action. Two projects will be analyzed in this EA. Project 1 is a proposal to commercially thin approximately 140 acres of 50 year old stands in the Matrix land use allocation. Project 2 is a proposal to girdle and/or fall 8 trees per acre within portions (37 acres) of the Riparian Reserve allocation to create some stand diversity within those areas.

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FINDING OF NO SIGNIFICANT IMPACT

Introduction

The Bureau of Land Management (BLM) has conducted an environmental analysis (Environmental Assessment Number OR080-03-06) for a proposal to commercially thin 140 acres of 50-year-old stands in the *Matrix* land use allocation and to girdle/fall approximately 8 trees per acre within 37 acres of Riparian Reserves to increase structural diversity. The project area is in the Crabtree Creek Watershed in Linn County within Township 11 South, Range 1 East, Section 1, Willamette Meridian and in the following land use allocations: Matrix and Riparian Reserves.

The environmental assessment (EA) is attached to and incorporated by reference in this Finding of No Significant Impact (FONSI) determination.

Implementation of the proposed action will conform to management actions and direction contained in the attached *Roaring River Environmental Assessment* and the *Salem District Record of Decision and Resource Management Plan* (RMP). The RMP, dated May 1995, is tiered to and incorporates the analysis contained in the *Salem District Proposed Resource Management Plan/Final Environmental Impact Statement* (RMP/FEIS) (September 1994). The RMP provides a comprehensive ecosystem management strategy in conformance with the following documents:

- *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late Successional and Old Growth Related Species Within the Range of the Northern Spotted Owl* (April 1994);
- *Final Supplemental Environmental Impact Statement on Management of Habitat for Late Successional and Old Growth Related Species Within the Range of the Northern Spotted Owl* (February 1994);
- *Record of Decision for Amendments to the Survey and Manage, Protection Buffer, and Other Mitigation Measures Standards and Guidelines (*ROD, January, 2001*);*
- *Final Supplemental Environmental Impact Statement for Survey and Manage, Protection Buffers, and Other Mitigation Measures in the Northwest Forest Plan (*FSEIS, November, 2000*);* and the
- *Implementation of 2001 Survey and Manage Annual Species Review (*June 2002*).*

The EA and FONSI will be made available for public review from **March 19 to April 18, 2003**. The notice for public comment will be published in a legal notice by the Albany Democrat Herald newspaper; sent to those individuals, organizations, and agencies that have requested to be involved in the environmental planning and decision making processes; and posted on the Internet at http://www.or.blm.gov/salem/html/planning/index.htm under Environmental Assessments.

Comments received by the Cascades Resource Area of the Salem District Office, 1717 Fabry Road SE, Salem, Oregon 97306, on or before April 18, 2003 at 4:00 PM, Pacific Daylight Saving Time, will be considered in making the final decisions for this project. Office hours are Monday through Friday, 7:30 A.M. to 4:00 P.M., excluding holidays.

Finding of No Significant Impact

Based upon review of the EA and supporting documents, I have determined that the Proposed Action (Alternative 2) is not a major federal action and would not significantly affect the quality of the human environment, individually or cumulatively with other actions in the general area.

No environmental effects meet the definition of significance in context or intensity as defined in 40 CFR 1508.27. Therefore, an environmental impact statement is not needed. This finding is based on the following discussion:

Context. The proposed action (commercial thinning and riparian treatments in 50-year old stands on 177 acres of BLM administered land) is not expected to have international, national, region wide, or statewide importance.

The discussion of the significance criteria that follows applies to the intended action and is within the context of local importance. Chapter 4 of the EA details the effects of the proposed action. None of the effects identified, including direct, indirect and cumulative effects, are considered to be significant and do not exceed those effects described in the RMP/FEIS.

Intensity. The following discussion is organized around the Ten Significance Criteria described in 40 CFR 1508.27.

1. **Impacts may be both beneficial and adverse.** Beneficial effects include: **1)** Project 1, in the long run, would result in increased average stand diameters, and distributing stand growth in the remaining trees (EA p. 26). **2)** Project 2 would enhance elements of structural diversity by creating snags and coarse woody debris (EA p. 27).

   Adverse effects associated with Project 1: **1)** Soil compaction associated with ground based yarding would remain within RMP standards and guidelines (EA p. 18); **2**) With the retention of full leave Riparian Reserves and no road construction, there is a low probability of measurable direct or indirect effects to water resources, including aquatic habitat (EA pp. 19, 26); **3)** Thinning would degrade approximately 140 acres of northern spotted dispersal habitat in the short term. The effect call is *"may affect, not likely to adversely affect"* the northern spotted owl (EA p.29); **4)** Other short term effects to flora and fauna include changes in microhabitat due to reducing the forest canopy. Habitat conditions within 10 – 20 years of the thinning would improve over the current existing condition (EA p. 29).

   Project design features and mitigation measures designed to reduce effects to resources are described in Chapter 2 (EA pp. 6-8) and Appendix 4 of the EA (EA pp. A:11 – A: 14). The environmental effects disclosed above and discussed in detail in Chapter 4 of the EA (EA pp. 17-37) and associated appendices (EA pp. A:1-A:14) are not considered significant, nor do the effects exceed those described in the RMP/FEIS.

2. **The degree to which the selected alternative will affect public health or safety.** Thinning and Riparian treatments are not expected to affect public health and safety.

3. **Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farm lands, wetlands, wild and scenic rivers, or ecologically critical areas.** There are no historic or cultural resources, parklands, prime farmlands, wild and scenic rivers, wilderness, or ecologically critical areas located within the project area (EA p. A-1). There is no northern spotted owl critical habitat in or near the project area.

4. **The degree to which the effects on the quality of the human environment are likely to be highly controversial.** Two letters and one e-mail were received during the scoping period (EA p. 3). The effects of the proposed action on the quality of the human environment were adequately understood by the interdisciplinary team to provide an environmental analysis. A disclosure of the predicted effects of the proposed action is contained in Chapter 4 of the EA and associated appendices.

5. **The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.** The proposed action is not unique or unusual. The BLM has experience implementing similar actions in similar areas. The environmental effects to the human environment are analyzed in Chapter 4 of the EA. There are no predicted effects on the human environment that are considered to be highly uncertain or involve unique or unknown risks.

6. **The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.** The proposed action does not set a precedent for future actions that may have significant effects, nor does it represent a decision in principle about a future consideration. Any future projects would be evaluated through the National Environmental Policy Act (NEPA) process and would stand on their own as to environmental effects.

7. **Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.** The interdisciplinary team evaluated the proposed action in context of past, present and reasonably foreseeable actions. Significant cumulative effects are not predicted. A complete disclosure of the effects of the project is contained in Chapter 4 of the EA.

8. **The degree to which the action may adversely affect districts, sites, highways, structures, or other objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.** The proposed action would not adversely affect districts, sites, highways, structures, or other objects listed in or eligible for listing in the National Register of Historic Places, nor would the proposed action cause loss or destruction of significant scientific, cultural, or historical resources (EA p. A-1).

9. **The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act (ESA) of 1973.**

Terrestrial Wildlife: The Roaring River proposal was submitted for Formal Consultation with U.S. Fish and Wildlife Service on September 3, 2002. Consultation with the USFWS resulted in a *"May Affect, Not Likely to Adversely Affect"* Determination for northern spotted owl. The proposed action will follow all applicable terms and conditions from the Biological Opinion dated February 27, 2003 [BO# 1-7-03-0008].

Fish: Consultation with NOAA Fisheries is required for projects that "may affect" species listed under the ESA of 1973 or their habitat. This project has been determined to have "no effect" on Upper Willamette River steelhead or Upper Willamette River chinook (EA p. 37).

10. **Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.** The proposed action does not violate any known Federal, State, or local law or requirement imposed for the protection of the environment. The EA and supporting Project Record contain discussions pertaining to the Endangered Species Act, National Historic Preservation Act, Clean Water Act, Clean Air Act, and Executive Order 12898 (Environmental Justice). State and local interests were given the opportunity to participate in the environmental analysis process. Furthermore, the proposed action alternative is consistent with applicable land management plans, policies, and programs.

Prepared by: Carolyn Sands — 3/18/03
Carolyn Sands, Planner — Date

Reviewed by: Rudy Hefter — 3/18/03
Rudy Hefter, NEPA — Date

Approved by: for Rudy Hefter — 3/18/03
Brad Keller, Acting Field Manager — Date
Cascades Resource Area

ENVIRONMENTAL ASSESSMENT

CHAPTER 1 - PROJECT SCOPE

Project Location

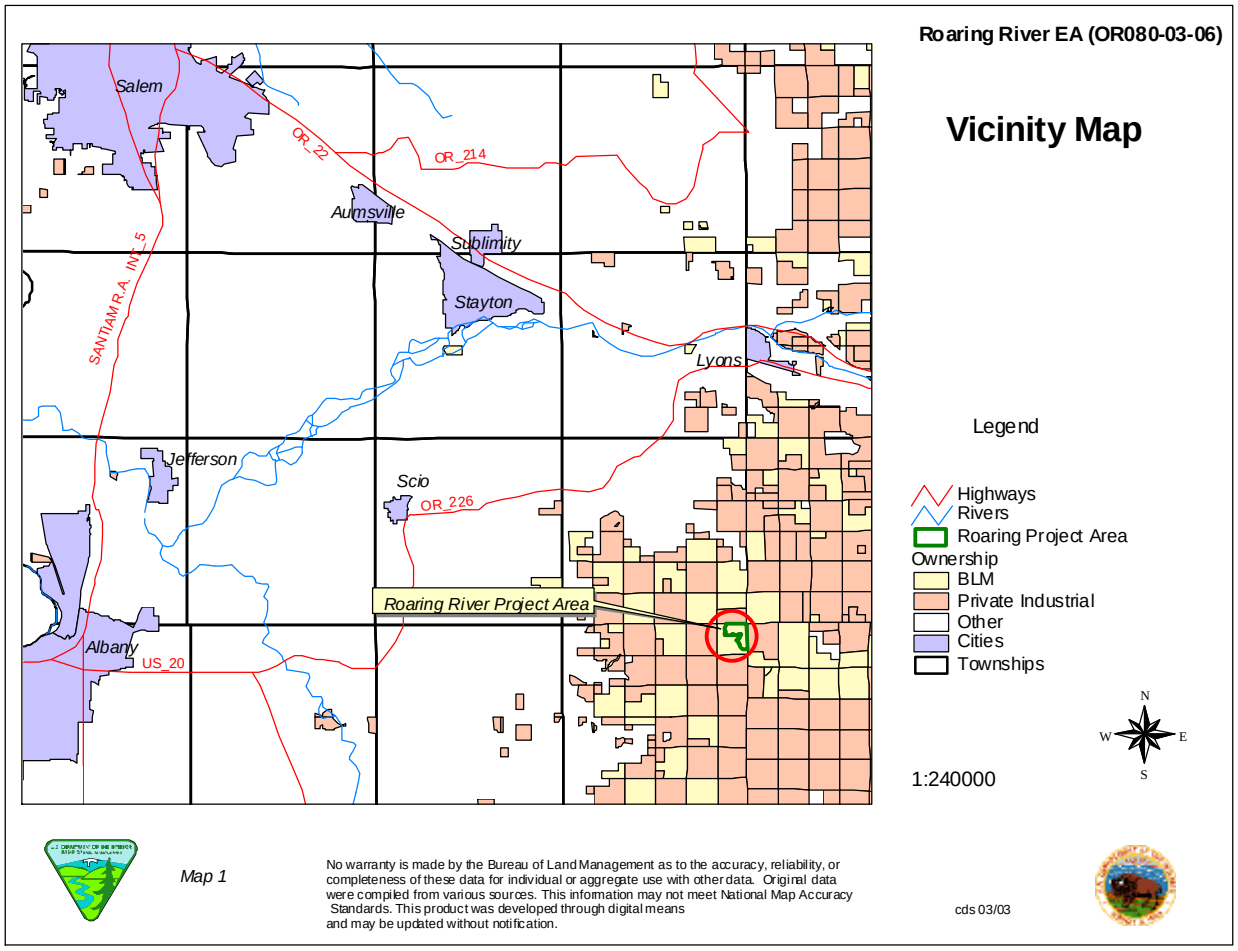
The project area is located approximately 11 miles southeast of Scio, Oregon, in Linn County on forested land managed by the Cascades Resource Area, Salem District of the Bureau of Land Management (BLM). The project area lies within the Crabtree Creek Watershed and is within Township 11 South, Range 1 East, Section 1, Willamette Meridian (Map 1).

The project area is within the following land allocations, habitats, or designations:

- Matrix and Riparian Reserve land use allocations as identified within the *Salem District Record of Decision and Resource Management Plan* (RMP) dated May 1995.
- Within the Municipal Watershed for the City of Jefferson.

None of the following land allocations, habitats, or designations occur within the project area: LSR, unmapped LSR, critical habitat, or core areas for the northern spotted owl; and special habitats.

Map 1: Vicinity Map



Purpose of and Need for Action[1]

The project area was clearcut with tractor skidding equipment in the 1950s. While portions of these stands have had pre-commercial thinning, other parts of the stand have had no subsequent treatments. These densely stocked are in need of thinning to optimize growth of the dominant trees in the stand and to achieve District timber management objectives. There is also a continuing need to provide a sustainable supply of timber and other forest products that would meet BLM timber management goals.

Mid-seral stands within the Riparian Reserves are missing structural components needed for a well functioning ecosystem. There is also a scarcity of standing dead/down coarse woody debris (CWD) habitat, especially larger material in the early stages of decay. (Crabtree WA p.7-1)

As directed by the *Salem District Record of Decision and Resource Management Plan* (RMP) and recommended by the *Crabtree Watershed Analysis* (Crabtree WA), the purpose of this project is to:

Project 1(Timber Management)

- Contribute to BLM timber management objectives by providing timber and other forest products, while protecting water quality and other resource values (RMP p. 1); and
- Develop stand characteristics to maintain future forest management options and to maintain terrestrial habitats to support a diversity of forest species on Matrix lands (RMP p. 1).

Project 2 (Riparian Treatments)

- Contribute to restoring a well functioning ecosystem by accelerating the development of certain attributes of stand diversity that are lacking in the mid-seral aged Riparian Reserves to progress toward attaining Aquatic Conservation Strategy Objectives (RMP p. 5).

Proposed Action

Project 1 (Timber Management): This project consists of thinning 140[2] acres of a 50 year old stand from below, leaving the largest, most dominant trees standing, with a ground based harvest system. The thinning would take place within the Matrix Land Allocation. Tree densities would be reduced from 190 trees per acre and 75 % canopy closure to 90 -120 trees per acre and 50-60% canopy closure. No road construction would take place. Road maintenance would take place on approximately 4 miles of existing paved roads and 5 miles of gravel roads.

Project 2 (Riparian Reserve Treatments): On up to 37 acres of the Riparian Reserves, outside the stream zone[3], this project proposes to create small canopy gaps or enhance existing small gaps by girdling or falling up to eight green trees per acre. These trees would either be girdled or felled to create a small canopy gap, or to maintain a larger "wolf" tree in a semi- open grown condition.

Decision to be Made

[1] The purpose and need for action defines the projects analyzed and the scope of an EA. It identifies current conditions in the project area or management direction that would lead to action.

[2] All numbers (e.g., acres, road lengths and volumes) are estimates based on GIS mapping and office analysis. Final numbers, determined during field work, will vary from these estimates. This variance is not expected to result in a change in effects analyzed in this document.

[3] The proposed action restricts any activity within 50 feet of streams (stream zone, SZ)

The Cascades Field Manager is the official responsible for deciding whether or not to prepare an environmental impact statement, and whether to approve this project as proposed, not at all, or to some other extent.

Scoping, Issues, and Other Elements of the Environment

Scoping

In compliance with NEPA, the project first appeared in the April 2002 edition of the quarterly *Salem District Project Update,* and in editions since then, which were mailed to over 1,000 addresses. A scoping letter dated January 2, 2003 was sent to 27 potentially affected and/or interested individuals, groups, and agencies. Two letters and one e-mail were received during the scoping period. These letters are available for inspection in the EA project file at the Salem District office. The letters contained the following concerns:

- ***Timber harvest, roads, mining, development and motorized recreation in roadless areas ≥ 1000 acres.***
  The proposed action is not within a Roadless Area.
- ***Timber harvest, roads, and mining in late-seral forests.***
  The proposed action is not within late-seral forests.
- ***Commercial harvest activities or road construction in key watersheds or municipal watersheds***
  The proposed timber management project is not within a key watershed. There is one municipal water user (City of Jefferson) on the South Santiam downstream from the project. The effects of commercial harvest activities on water quality is described in Chapter 4 (p. 19)
- ***The NEPA documentation proposal should have a full Range of Alternatives containing restoration projects.***
  The development of the alternatives is described in Chapter 2 (p. 4)
- ***New Road Construction (including temporary road construction)***
  No road construction would take place in the proposed action.
- ***Effects on Lynx***
  The project area is not within the range of lynx, nor is it lynx habitat.

Issues

Considering public scoping and interdisciplinary team input, the following issues with the proposed action were identified:

Negative Impacts of Ground Based Yarding: An alternative using other than ground based yarding systems was considered and documented in Chapter 2 (p. 9). The effects of ground based yarding on resources are addressed in Chapter 4 (pp. 18, 26) and Appendix 4 (p. A-11).

Other Elements of the Environment

The effect of the alternatives on the following elements of the environment will be analyzed in Chapters 2-4 and Appendices 1-4: Soil and Water; Fisheries and Aquatic Habitat; Vegetation; Terrestrial Wildlife; Fire and Fuels; and Recreation, Rural Interface, and Visual Resources.

CHAPTER 2 – ALTERNATIVES, INCLUDING THE PROPOSED ACTION

Alternative Development

In addition to Alternatives 1 and 2 described above, the IDT considered additional areas for potential harvest and discussed a variety of additional options during the course of the analysis. All alternatives except Alternatives 1 and 2 were dropped from detailed analysis for reason described in the section entitled Alternatives Dropped from Detailed Analysis (p. 9).

Alternative 1 (No Action)

The BLM would not implement any of the Roaring River projects at this time. The local plant and animal communities would be dependent on and respond to ecological processes that would continue to occur based on the existing condition. This alternative serves to set the environmental baseline for comparing effects to the proposed action.

Alternative 2 (Proposed Action)

Project 1 (Timber Management)

Treatment Areas

- Commercial thinning would take place within the Matrix (green areas of Map 1).
- No timber harvest would take place within Riparian Reserves.

Silvicultural Treatment

- Stands would be thinned from below, leaving the largest, most dominant trees standing.
- Tree densities would be reduced from approximately 190 trees per acre and 75 % canopy closure to 90 -120 trees per acre and 50-60% canopy closure. Figure 1 shows the approximate appearance of the stand before Silviculture treatments while Figure 2 shows the approximate appearance of the stand as a result of this treatment.

Figures 1 and 2 show the approximate appearance of the overstory before and after treatment.

The stand has been divided into 4 units A-1, A-2, A-3, and A-4.

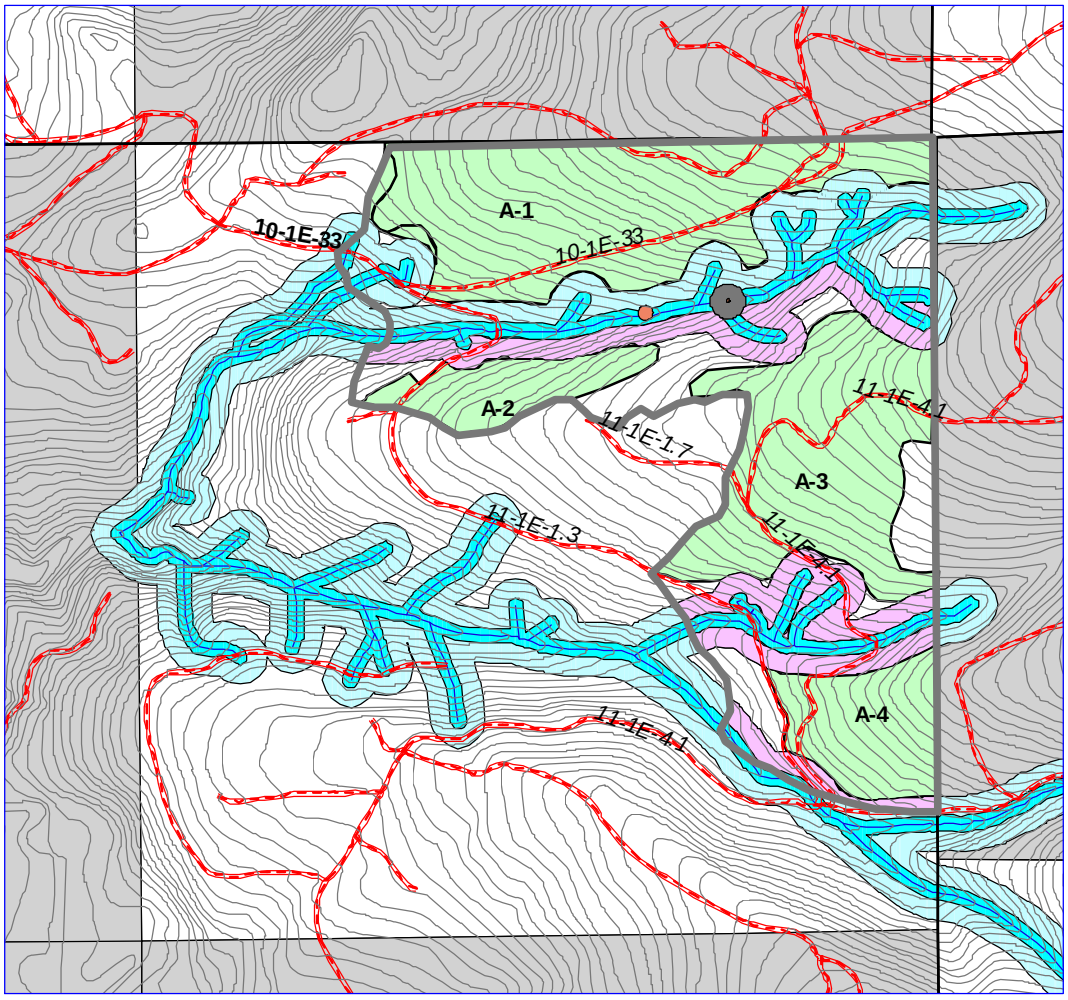
Table 1: Summary of Stand and Silvicultural Treatment Information by Unit

Unit Number	EA Acres	Mapped Stand Type	Mapped Stand Age	Alternative 2 Harvest Method
A-1	60	D3H3 = 1950	50	Commercial Thinning
A-2	12			
A-3	50			
A-4	18			
Total	140			

Map 2: Alternative 2 (Proposed Action)

Roaring River EA (#OR080-03-06)

Alternative 2 (Proposed Action)



Legend

- Roaring Project Area
- Townships
- COAQ site
- 100 ft buffer on coaq site
- Contour
- Contour
- Existing Roads
- 50 ft. Mollusk buffers
- Streams
- Project 2 (Riparian Treatment)
- Stream Zone - No Entry
- Riparian Reserves
- Project 1 (Commercial Thining)

Ownership

- BLM
- Private

Map 2

T. 11 S., R. 1 E., Section 1, WM

Scale: 1:12000

N
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March 2003
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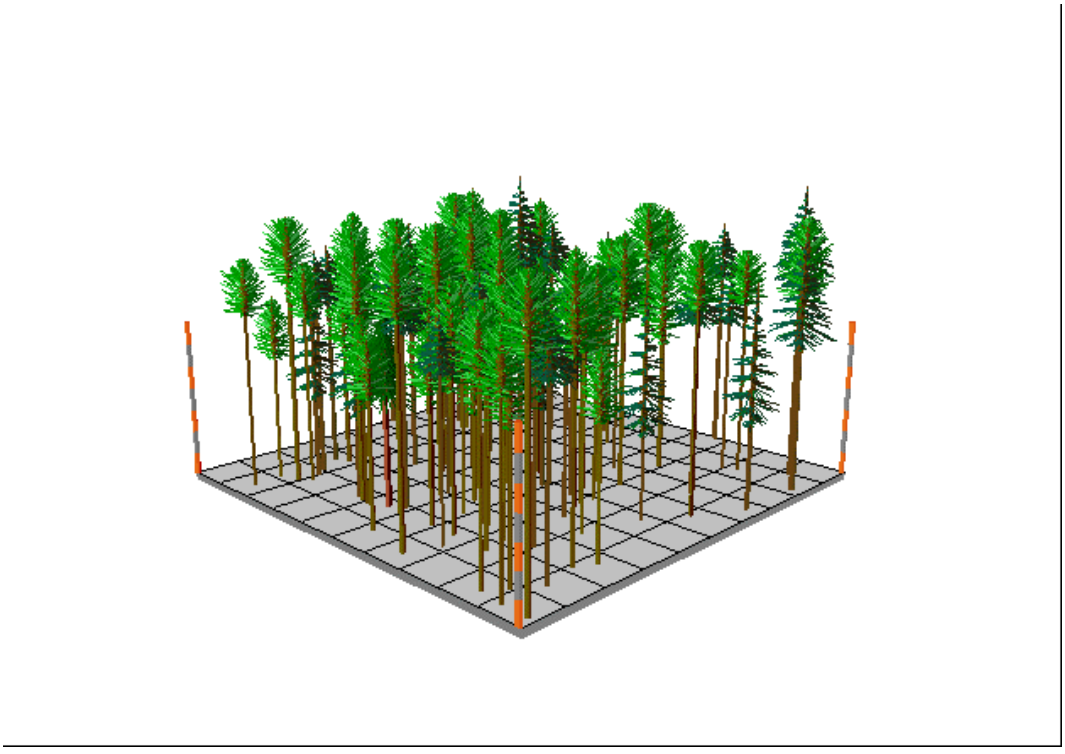
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

Figure 1: Approximate Appearance of Stand Overstory Before Thinning

Figure 2: Approximate Appearance of Stand Overstory After Thinning



Yarding

- All ground based yarding would take place on slopes less than 35 percent.
- Tractor yarding would be limited to existing skid roads, where possible.
- When possible, harvester equipment would be restricted to one pass and to walk on top of logging slash.

Additional Design features are described in Appendix 4 (p. A- 11).

Road Access

- No road construction would take place.
- Road renovation would consist of regular road maintenance on 4 miles of paved road and 5 miles of aggregate (e.g. gravel) road. Road maintenance and renovation includes roadside brushing, blading the road surface, spot rocking and ditch and culvert maintenance (including replacing several small culverts that no longer function) to maintain roads to the standards described in the transportation management objectives and Best Management Practices in the RMP. These standards are designed to provide for safety, reduce the potential for sediment entering streams from the roads, and facilitate timber harvest.

Season of Operation

Table 2: Season of Operation

Operation	Season of Operation or Operating Conditions	Benefiting Resource
Falling	July 16 – February 28	Residual Trees (Bark and Cambium),
		Northern Spotted Owl
Yarding/Loading	Dry/Frozen Road Conditions	Soils and Water
	July 16 – February 28	Northern Spotted Owl
Hauling	Dry/Frozen Road Conditions	Soils and Water
	July 16 – February 28	Northern Spotted Owl
Fuels Treatment (Burning piles)	November 1-February 28	Reduce risk of wild fire

Fuels Treatment

There are two fuels treatments and no fire ecological treatments proposed for the preferred alternative (partial cut all units, Alternative 2). Under Alternative 2, all landing piles and miscellaneous piles would be covered and burned. Activity created fuels in Unit A-1, A-2, A-3 and A-4 adjacent to BLM road 11-3E-1.3, 11-1E-33 and 11-4E-4.1, would be removed within twenty-five feet of the road edge to provide a fuel reduction corridor. This would reduce the threat of wildfire from roadside ignition sources.

Machine piling, covering and burning of landing piles and any miscellaneous debris pile would remove the largest concentrations of fuels along the road system in the sale area. Removal of landing piles would also remove potential fire control problems in case of a low intensity wildfire.

Blocking skid roads

After operations skid roads would be blocked in order to minimize additional soil disturbance and damage to other forest resources from off road vehicle (ORV) use, since there are no gates to limit their access to the project area from Neal Creek road system.

Project Design Features and Mitigation Measures

Project Design Features and Mitigation Measures are described in Appendix 4 (pp. A-11 -14).

Project 2 (Riparian Treatments)

Habitat restoration treatments without wood removal would be done independent of the timber sale within portions of the Riparian Reserve network within T.11S., R.1E., Section 1 (see Map 2).

The portions of Riparian Reserve proposed for treatment represent the mid-seral timber type described in Chapter 3. On up to 37 acres of these Riparian Reserves, create small canopy gaps or enhance existing small gaps by girdling or falling up to eight green trees per acre. These trees would either be girdled or felled to create a small canopy gap, or to maintain a larger "wolf" tree in a semi-open grown condition. The girdling may be accomplished by either top or base girdling methods. The proposed treatment would not reduce existing shade levels from any stream channel.

The treatments may be accomplished in two separate operations spaced approximately four years apart to minimize risk of potential Douglas-fir bark beetle damage to residual green Douglas-fir trees. Appendix 4 includes additional mitigation measures.

Comparison of Alternatives for Selected Parameters for Project 1

Table 3: Comparison of Alternatives for Selected Parameters

Parameters	Alternatives	
	No Action	**Alternative 2 (Proposed Action)**
Commercial Thinning Acres in Matrix	0	140
Approximate Green Trees per Acre after treatment	190	90 -120
Canopy Closure	75 %	50-60%
Estimated Harvest Volume (MBF - thousand board feet)	0	1400
Road maintenance on paved roads	0	4
Road maintenance on aggregate roads (gravel)	0	5

Alternatives Dropped from Detailed Analysis for Project 1

The IDT considered the following alternatives that were dropped from detailed analysis.

Additional Harvest Units

The following units were dropped from this project due to resource conflicts.

Section 1

Of the areas surveyed, approximately 220 acres were dropped from further consideration and are no longer included in the Roaring River proposal. Some of these acres were stands within the Riparian Reserve allocation but had adequate structural diversity so treatments were not needed. Other areas had slopes greater than 35 % and were not accessible by the current road network. These acres were dropped to avoid new road construction. Finally, another area was dropped because further field reconnaissance determined that the stands were not ready for thinning.

Section 3

Of the areas surveyed, approximately 448 acres were dropped from further consideration and are no longer included in the Roaring River proposal. This is due to the presence of mollusks. In addition, the proposed thinning treatments would not be silviculturally beneficial to the stands at this time because the overstory trees have established dominance and are growing at the rate that is expected in this stage of the stand's development.

Riparian Reserve Thinning

Thinning portions of Riparian Reserves was considered then dropped for the following reasons:

- Cable Yarding would require road construction, which for these stands was not economically efficient.
- Ground based yarding was considered and dropped because many of the slopes within the Riparian Reserves were more than 35%, and soil types precluded ground based yarding within Riparian Reserves.
- Yarding trees within the Riparian Reserves with a drumline to a skid road outside of the Riparian Reserve was considered and dropped due to soils concerns.

No Ground Based Yarding

As a result of the scoping letters, an alternative with no ground based yarding was evaluated and then dropped for the following reasons:

- Cable yarding on slopes that are too flat would result in not getting enough lift on the logs to get one end suspension, resulting in more dragging of logs. Dragging logs would result in more soil gouging and possible soil displacement. There are enough skid roads left over from the original logging where using existing skid roads would result in less soil disturbance than a cable yarding system with the proposed units. Finally, with a cable yarding system, additional reserve trees would have to be cut to create yarding corridors.
- For this area, ground based yarding is the most economical yarding system. The probability that purchasers would bid on this sale with a cable yarding system is low. In addition, approximately 1000 feet of road reconstruction and 600 feet of new road construction would be needed to provide access to cable yard the 10 acres in units A-2 and A-3 with slopes greater than 35 percent. It is more economically feasible to drop the cable acreage than to construct the road. No new road construction is necessary with a ground based yarding system.

CHAPTER 3 - AFFECTED ENVIRONMENT

Chapter 3 shows the present condition within the project area. The "no action" alternative sets the environmental base line for comparing effects of the action alternatives.

Soil and Water

Soils

The proposed timber sale is located within the Western Cascades physiographic region. It is in the Roaring River Sub-watershed of the Crabtree Creek 5th Field Watershed. Typical soils within this area formed in colluvium (material rolling downhill) from andesite, basalt, and volcanic ash. These warm soils are gentle sloping to very steep, deep and moderately deep, well-drained clay loams, stony loams, and gravelly loams. A complete description of this area's soil classifications can be found in the *Roaring River Soils Report* in the EA project file. The primary timber management concerns for the soil classifications are yarding on steep slopes, ground-based yarding during wet soil conditions, and competition from brush and hardwood species during regeneration.

The timber productivity capability class system (TPCC) is a method used to classify lands based on the physical and biological capabilities of the site to support and produce forest products on a sustained yield basis. The system identifies potential soil limitations with regard to harvesting and reforestation. All units, excluding riparian treatment, are mapped as having no soils limitations that would withdraw them from the timber base. The timber capability classes for this area are further described in the *Roaring River Soils Report* in the EA project file.

The current extent of skid trails, within a majority of the proposed harvest units, is approximately 35% of the project area (see Figure 5: 1959 Aerial Photography of the Project Area). Most of this affected area has at least partial recovery, as witnessed by the trees growing within the old skid trails (see Figure 6: 1998 Aerial Photography of the Project Area). Complete recovery of compaction takes several decades (Froehlich, OSU, 1992). It is generally thought that recovery would be complete within approximately eighty years, with the greatest amount of recovery occurring within the first decades of the recovery period. Since these areas were logged fifty years ago, it can be projected that compacted areas have recovered by more than fifty percent.

Hydrology and Water Quality

Project Area Precipitation and Basin Hydrology: The project area is located in the Oregon Western Cascades range at elevations between 2,500 - 2,900 feet. Most of the project area is subject to rain on snow events (ROS), which have the potential to increase peak flows during winter or spring storms. The project area receives approximately 70 -78 inches of rain annually and has a mean 2-year precipitation event of 3.5 inches in a 24-hour period (*N.O.A.A. Precipitation-Frequency Atlas for Oregon, Volume X*). The project area is in the Roaring River 6th field watershed.

Project Area Stream Flow

There are no stream gaging stations on Crabtree Creek and none of the tributary channels in the project area have been gaged. Streamflow is assumed to be typical of western cascades streams where most stream flow occurs during winter storm events. Peak flows occur following a rapid and substantial depletion of the snowpack during prolonged rain-on-snow periods (ROS) in the "transient snow zone," estimated to lie between 1500 feet and 3000 feet elevation. Base-flow or low-flow occurs during late summer and early fall when mean stream discharge drops below 20% of the mean winter flow. Many small headwater channels dry up completely during this period.

Project Area Stream Channels

Streams in the project are categorized as Rosgen "B4" channels (Rosgen, 1996). There is a large supply of gravel and sand sized material actively transported in these channels. The large sediment supply coupled with an ample supply of wood has resulted in a complex, meandering channel with many, small zones of sediment deposit (i.e., bars, flood plains, and wetlands).

It is likely that ground water and intricate patterns of subsurface flow, as opposed to surface run-off, is the primary system of water delivery to the main channel. Small tributary channels on the deep soils of the adjacent valley slopes flow intermittently on the surface before disappearing underground, only to pop out again at unexpected locations.

Utilizing the Montgomery-Buffington typology (*Montgomery & Buffington, 1997*), all the channels in the project area would be classified as colluvial: "small, headwater streams at the tips of a channel network that flow over a colluvial valley fill and exhibit weak or ephemeral fluvial transport." Episodic transport by debris flows may account for most of the sediment transport in these steep headwater channels. All the channels viewed in the field are currently in "proper functioning condition" (*U.S.D.I., 1998*).

Project Area Water Quality

The water quality parameters with the potential to be affected by this proposal include stream temperature, dissolved oxygen (DO) concentrations, hydrogen ion concentration (pH), and turbidity. Additional water quality parameters (e.g., nutrients, pesticide and herbicide residues, bacteria, etc.) are not highly sensitive to forest harvest and road construction (*U.S.E.P.A.,1991*) and were not reviewed for this analysis.

Stream Temperature: The Crabtree Watershed Analysis (BLM, 2001) indicated that summer stream temperatures in the main stem are above the State of Oregon's threshold of 17.8 degrees Centigrade (C). Data collected on Roaring River just downstream of the project area indicate that stream temperatures here remained below 12 degrees C for most of the summer of 2000, well below the state standard.

Dissolved Oxygen, pH, and Conductivity: No data for these variables in the project area were located for this assessment. Considering the low stream temperatures in the project area, together with full forest cover, it is likely that DO and pH levels are within the range of natural variation and meet state standards. The Crabtree Watershed Analysis stated that "data collected by the South Santiam Watershed Council indicate dissolved oxygen and pH are probably not of concern in Crabtree Creek (Ch.5, Pg.29)."

Turbidity and Sediment: No data for stream turbidity in the project area were located for this assessment.

Oregon Department of Environmental Quality: The Roaring River is not listed as water quality limited by the State of Oregon. However, Crabtree Creek is listed as not meeting water quality standards for summer stream temperatures from the mouth to river mile 32.1. The DEQ is currently developing a Total Maximum Daily Load (TMDL) for the watershed.

Beneficial Uses: Beneficial uses of surface water from the project area are displayed in **Table 4**. There is one municipal water user (City of Jefferson) on the South Santiam downstream from the project area as well as water withdrawals for domestic use, irrigation and livestock watering.

Table 4: Beneficial Uses Associated With Streams In The Project Area.

Stream (Watershed): Roaring River		
Project Action: Timber Harvest (Commercial Thinning)		
Beneficial Use	**Distance from Project Action**	**Information Source**
Salmonid Rearing And Spawning	>1 mile downstream in Crabtree Creek	BLM
Resident Fish	>1 mile downstream in Crabtree Creek	BLM
Domestic, Irrigation & Live-Stock Watering	3 miles downstream in Crabtree Creek	WRIS*
Municipal	>10 miles in Crabtree Creek	BLM

* WRIS = *Water Rights Information System* of the Oregon Department of Water Resources

Current conditions for Hydrology and Water Quality are further described in *Hydrology / Channels/Water Quality: Environmental Assessment For The Proposed Roaring River Project* located in the Roaring River EA project file.

Fisheries and Aquatic Habitat

Roaring River is tributary to Crabtree Creek, which is tributary to the South Santiam River. Crabtree Creek supports anadromous populations of spring chinook salmon (*Oncorhynchus tshawytscha*), winter steelhead trout (*O. mykiss*) and Pacific lamprey (*Entosphenus tridentatus*). Resident fish species known to inhabit Crabtree Creek are cutthroat (*O. clarki*) and rainbow trout (*O. mykiss*), mountain whitefish (*Prosopium williamsoni*), dace (*Rhinicthys spp.*) and sculpin (*Cottus spp.*). The lower reaches of Crabtree Creek support a population of redside shiner (*Richardsonius balteatus*) and non-native populations of largemouth (*Micropterus salmoides*) and smallmouth bass (*M. dolomieui*). The South Santiam River supports a similar mix of species and possibly one or more additional exotic species.

The Oregon Department of Fish and Wildlife operates a fish hatchery at approximate river mile (RM) 1 on Roaring River. Upstream migration of anadromous fish is blocked by a weir at the Roaring River Hatchery. Sampling for fish presence/absence was conducted with an electroshocker on all streams (unnamed tributaries to Roaring River) in T 11S, R 1E, section 1 on May 21, 2001. No fish were found in any of the streams, although habitat quality appeared high for cutthroat trout. Absence of fish was consistent with the findings of other surveys conducted in the area in 1996 and 1997.

Threatened and Endangered and Special Attention Species: Upper Willamette River steelhead trout and Upper Willamette River chinook salmon are listed as 'threatened' under the Endangered Species Act of 1973, as amended. Both species are found in Crabtree Creek and in the South Santiam River. Consultation with NOAA Fisheries is described in Chapter 4 (EA p.37).

Vegetation

General: The area was clearcut (tractor) logged in the 1940's and 50's, making the current stand approximately 50 years old. 1959 photos of the area show that few trees remained after the initial harvest (p. A-15). The current over-story throughout is dominated by 50+ year old Douglas-fir and western hemlock but also contained a mix of mountain hemlock (*Tsuga mertensiana*), western red cedar, noble fir, red alder, big leaf maple, and a few black cottonwoods. There are no residual large snags present in any of the units. Large coarse woody debris is present, however it is in the advanced decay classes. In addition, large old growth stumps are present throughout the stand. Severe dwarf mistletoe infections are scattered throughout all four units.

The area is bordered to the north and east by private land with an over-story much like that of the proposed project area with the exception of the private land to the north having been recently commercially thinned. The areas to the south and west of the project area are BLM lands with over-stories of differing ages ranging from 25 to 130 plus years of age (p. A-15).

Riparian Reserve Habitat: Riparian Reserves within the project area are associated with mid-seral conifer timber types. These stands originate from the logging operations that occurred during the 1940's, 1950's, and 1960's. Species composition is diverse with western hemlock, western redcedar, Douglas-fir, red alder, and noble fir being the major tree species on site. Average tree size is fifteen inches in diameter; however, some trees can be found that are greater than twenty inches in diameter.

Most of these acres were pre-commercially thinned to an approximate twelve-foot spacing. The result is a very uniformly spaced and thickly stocked overstory with minimal understory development due to lack of adequate light. A light incidence of dwarf mistletoe infection exists in the western hemlock portion of the overstory. Occasional small pockets of a more moderate infestation level can be found. Coarse woody debris in the more advanced decay classes is abundant, while snag levels are minimal. Riparian habitat is further described in *Roaring River Riparian Reserve Treatments* located in the Roaring River EA project file.

A large population of phantom orchid (*Eburophyton austiniae*) was found in the northwest corner of this unit just above a small wooded wetland type seep. Although not rare, phantom orchid is relatively uncommon so the large number of individual flowering plants at this site makes this population unique. The close proximity of this population to the wooded wetland/seep places this population within the Riparian Reserve surrounding the wetland/seep, thus protecting it from any disturbance related to the proposed project.

Special Status/Attention Species: Surveys were completed in T. 11S., R.1E., Sec.1 on 7/25/01 & 8/1,6,8/01. More information about survey methods and survey results is described in *Roaring River: Biological Evaluation For Special Status Plant Species/Survey & Manage Species And Noxious Weeds* located in the Roaring River EA project file.

Due to the close proximity of this proposed unit to known *Bridgeoporus nobilissimus* (*BRNO*) (S&M-A and Special Status Species fungi) populations and the suitable substrate that existed at this site, surveys for *BRNO* were conducted in conjunction with the general botany surveys. Although suitable substrate existed (i.e. large noble fir/pacific fir stumps) no *BRNO* fruiting bodies were located.

The following Special Status/Attention Species were found within the project area:

- *Corydalis aquae-gelidae:* Due to the nature of the proposed project, a 100ft radius no entry protection buffer would be placed around the *Corydalis aquae-gelidae* (COAQ) population, and a 50ft no entry buffer would be placed on all creeks within the project area preventing impact to the known COAQ population, any undiscovered populations or any potential habitat.
- *Pannaria saubinetii***:** The status of this lichen species has not been determined, though it appears to be uncommon rather than rare and it is not associated with old-growth forest. At this time no protection for this species is required.

Invasive Species: The following invasive species were found during surveys: bull thistle (*Cirsium vulgare),* Scotch broom *(Cytisus scoparius)* and tansy ragwort *(Senecio jacobaea).* All of the noxious weeds identified during the field survey(s) of the proposed Roaring River T.S. area are common roadside weed species. These weed species are commonly found throughout western Oregon, tending to occupy areas of high light and ground disturbance (i.e. road corridors and fields).

Terrestrial Wildlife

Old Growth Remnants*:* There are few if any remnant old growth trees.

Remnants, Snags and Coarse Woody Debris (CWD): Due to the extensive logging that occurred during the middle of the last century, snags are very rare and CWD is limited to older (class 4+) large logs and recently recruited small diameter logs.

Special Habitats: Special habitats include meadows, talus slopes, cliffs, and wetlands. There are no special habitats present within the proposed units.

Late Successional Habitat: Late Successional Habitat would not be affected by this proposed action. Approximately 36 percent of the Federal lands within the Crabtree watershed is in a late successional (seral) habitat condition, none of which would be directly or indirectly affected by the proposed action.

Road Densities: The Roaring River proposal is located in the Roaring River sub-watershed of the Crabtree Creek 5th field watershed. Road densities in the area are currently calculated at about 4.4 miles per section, which is considered high. Public roads are generally open to travel but private roads are gated. Vehicular access is seasonal with snow limiting access for two to three months during an average winter.

Special Status/SEIS Special Attention, and Other Species of Concern:

Federally Listed Species

Northern spotted owl: The Roaring River proposed project area is characterized as dispersal habitat and is located greater than one and one half miles from the nearest northern spotted owl known site. There are no unmapped LSRs within the project area. The project area is all within the GFMA land use allocation. The closest unmapped LSR is approximately 2.25 miles to the northwest.

Bald Eagle: Bald eagles have never been observed in the vicinity of the Roaring River project area.

Bureau Sensitive, SEIS Special Attention, and Other Species of Concern

Amphibians: Amphibian surveys were conducted concurrently with mollusk surveys. There were none found. The Oregon slender salamander, a Bureau Sensitive species was not detected.

Bats: Four species of bats, listed as Protection Buffer and/or Bureau Tracking species, could potentially be present in the project area. These species are associated with caves and mines, bridges, buildings, cliff habitat, or large standing culls and snags with bark still attached. Habitat surveys were conducted in the fall of 2002. No mines, caves, bridges, buildings or suitable cliffs were found. There are no snags or standing dead trees with bark attached that would provide suitable habitat for bats.

Goshawk: The goshawk is a Bureau Sensitive species that prefers older forests with dense canopy closures at higher elevations. The proposed units are located at mid elevations. The habitat in the vicinity of the units is marginally suitable for goshawks. No goshawks have been observed in the Roaring River project area.

Olive-Sided Flycatcher: The olive-sided flycatcher, a Bureau Tracking species, utilizes snags and remnant green trees that emerge above the canopy in forested areas, or in open areas with legacy trees. The species is uncommon and local throughout the resource area at all elevations. The general habitat features preferred by this species are not present within or directly adjacent to the proposed project area. Olive sided flycatchers have not been observed within or adjacent to the proposed units.

Red Tree Vole: The red tree vole, a Survey and Manage species according to the Northwest Forest Plan, is generally thought to be associated with late successional forests. However, numerous sightings have been documented in younger forests. The red tree vole resides almost exclusively in the forest canopy of Douglas fir trees where it builds nests and feeding stations and forages on Douglas fir needles. The entire 140-acre proposed thinning is considered to be marginal red tree vole habitat for the following reasons:

- Douglas fir represents less than 50 percent of the over-story within the project area.
- Spatial separation of Douglas fir trees results in poor tree to tree connection for red tree vole dispersal.

Surveys to protocol were conducted in August and September of 2001 with no active, inactive or potential nests being identified.

Survey and Manage Mollusks: Four Survey and Manage Mollusk species are suspected to occur within the Cascades Resource Area and as such, require protocol surveys. Surveys to protocol were conducted between April and July of 2002 in compliance with the "Survey Protocol for Terrestrial Mollusk Species for the Northwest Forest Plan," Version 2.1 dated 10/98 (see *Wildlife Report: FY 2003 Roaring River* located in the Roaring River EA project file).

Survey Results: One ***Megomphix hemphilli*** site (individual snail) was detected in the Riparian Reserve adjacent to Unit A-1 (see Map 2 on p. 5).

Habitat description and species occurrence in the vicinity of the proposal are further described in *Wildlife Report: FY 2003 Roaring River* located in the Roaring River EA project file.

Fire and Fuels

Fuel loadings in the project area prior to harvesting are measured to be 30-40 tons per acre, with few fuels in the 0.0-9.0 inch size class. Most of the fuel loading is decay class 4 and 5 logs greater than 20 inches. After harvest fuel loadings are estimated to increase to 55-60 tons per acre with most of the increase in the 0.0-9.0 inch size classes.

Recreation, Rural Interface and Visual Resources

Recreation: All of the proposed units are characterized by a forest setting. Evidence of man-made modifications (roads, logging, utilities, residential development) is common on both private and public lands in general area around the units. Forest management activities are likely to continue on private and public forest lands in the vicinity of the units. There are no developed recreational facilities within or near any of the units. A private gate, blocking the road leading to the units, limits public motorized access. Recreational use of the units is estimated to be low. Some of the recreational activities that may occur include camping, hunting, target shooting, hiking, and horseback riding.

Rural Interface: None of the proposed units are within a Rural Interface Area.

Visual Resources*:* The intermixed land ownership pattern between public and private forest land in the vicinity of the proposed units, greatly limits the BLM's ability to manage this area as a contiguous viewshed. Timber harvest activities near or adjacent to the units are observable on private and public lands.

Visual Resource Management (VRM) Class IV: The Salem District RMP calls for managing Class IV lands for moderate levels of change with the allowance for major modifications to the existing landscape character. Management activities may dominate the view and be the major focus of viewer attention. All of the proposed units fall under a VRM Class IV category. These units are seldom seen. Little or none of the units appear to be observable from major public travel routes, recreation areas, residences, or other key observation points. No special visual features or specific concerns were identified.

CHAPTER 4 - ENVIRONMENTAL EFFECTS

Chapter 4 describes the changes that can be expected from implementing the action alternative or taking no action at this time. The environmental effects (changes from present base-line condition) that are described in this chapter reflect the following elements of the environment (i.e Soil and Water; Fisheries and Aquatic Habitat; Vegetation; Terrestrial Wildlife; Fire and Fuels; and Recreation, Rural Interface, and Visual Resources). For those resources or values for which review is required by statute, regulation, Executive Order, or policy, Appendix 1 contains the documentation as to the effects of the proposed action on those resources or values. For a full discussion of the physical, biological, and social resources of the Salem District, refer to the Final Environmental Impact Statement (FEIS), dated September 1994, for the Salem District Resource Management Plan. The discussion in this document is site specific[4] and supplements the discussion in the FEIS. Effects to resources by alternative are compared at the end of this chapter.

[4] This EA does not attempt to re-analyze all possible impacts that have already been analyzed in the FEIS, but rather to identify the particular site-specific impacts that could reasonably occur.

Soil and Water

Alternative 1: No Action Alternative

Soils: Soil conditions associated with the No Action Alternative would be maintained as described in the Affected Environment. Current soil compaction within the project area, associated with past logging, would continue to recover at the current rate. No new soil compaction or displacement would take place within the project area (EA p.10).

Hydrology and Water: Under this alternative the existing water quality conditions, stream flows, and channel conditions at the project site would continue their current trends of change (p.10).

Alternative 2: Proposed Action

Project 1 (Timber Management)

Soils

Chapter 3 (p. 10) states that the primary timber management concerns for the soil classifications within the project area are yarding on steep slopes, ground-based yarding during wet soil conditions, and competition from brush and hardwood species during regeneration. Since no mechanized equipment would be allowed on slopes greater than 35 percent, ground-based yarding would be restricted to dry season conditions on slopes less than 35 percent, and no regeneration cutting is planned on any harvest unit, none of these limiting conditions would apply to this timber sale.

Ground-Based Yarding: This proposal would cover a maximum of 10% of the aerial extent within each harvest unit. Since existing skid roads would be reused, whenever possible, further soil disturbance (i.e., compaction, displacement and gouging) would be minimized to about 5% more than the existing amount from the previous harvest entries. Compaction associated with yarding operations could reduce soil productivity and the ability for the soil to absorb water (water infiltration through soil) in these areas. Complete recovery of compaction takes several decades (Froehlich, OSU, 1992). It is generally thought that recovery would be complete within approximately eighty years, with the greatest amount of recovery occurring within the first decades of the recovery period. Based on these statistics, the area is expected to recover approximately 40-50 percent by the time the stands are ready for regeneration harvest (in approximately 40 years). After regeneration harvest of these stands, skid roads would be decommissioned, reducing soil compaction from skid roads to less than 5 percent.

Runoff associated with the compaction from yarding equipment is expected to be absorbed within the Riparian Reserves where no ground disturbance would take place. Soil displacement would take place as a result of dragging logs to skid trails and landings. With the majority of the soils with low erodability and operating on less than 35 % slopes would reduce the risk of soil moving.

Fuels Treatments: Machine piling and burning has a few negative effects. These include the elimination of the duff/litter layer; removal of organic matter and the elimination of soil structure in the upper layers of the soil A-horizon; the increase in soil erosion and rain compaction of the individual burn sites. Burning of piles would be done in accordance with "The Oregon Smoke Management Plan". Generally speaking, piles would be burned when the surrounding vegetation and activity fuels would not support active burning at the close of a protracted east wind event. This would usually occur after November 1st of any given year. Usually by November 1 the ground is saturated and this includes the soil under landing piles. These wet soil conditions moderate the heat damage done to the soil when the piles are burned.

Main Skid Trail Blocking: Blocking existing skid trails would not affect long-term site productivity and may prevent additional site productivity loss associated with people driving on skid trails used for harvest operations prior to vegetation growing back in these areas.

Hydrology and Water Quality

Summary

Measurable direct and indirect effects to stream flow, channel function, and water quality as a result of the action alternative are of low probability. Alternative 2 is unlikely to alter the current condition of the aquatic system either by affecting its physical integrity, water quality, sediment regime or in-stream flows.

This proposal is unlikely to directly alter base flow or peak flow events in a measurable manner. Tree removal would not occur on steep, unstable slopes where the potential for mass wasting adjacent to stream reaches is high. Therefore, increases in sediment delivery to streams due to mass wasting are unlikely to result from this action. In addition, potential impacts resulting from tree harvest would be mitigated and, with the implementation of Best Management Practices (BMPs), are unlikely to contribute measurable amounts of sediment to streams. No harvest would take place within Riparian Reserves. Vegetative roughness within full leave riparian reserves is expected to absorb runoff before reaching streams. Nearly all riparian forest cover is retained thereby maintaining riparian microclimate conditions and protecting streams from increases in temperature.

In conclusion, this proposal is unlikely to impede and/or prevent attainment of the stream flow and basin hydrology, channel function, or water quality objectives of the Aquatic Conservation Strategy (ACS). A description of the project's effect on each ACS objective can be found in Appendix 2 (p. A- 4). The effects to hydrology and water quality are described in further detail in *Hydrology/Channels/Water Quality: Environmental Assessment For The Proposed Roaring River Project* located in the Roaring River EA project file.

Project Area Stream Flow (ACSO 6)

Mean Annual Water Yield: Increases in mean annual water yield following the removal of watershed vegetation have been documented in numerous studies around the world (*Bosch et al., 1982*). Presumably, vegetation intercepts and evapotranspires precipitation that might otherwise become runoff. Thus, it can be assumed that the action alternative considered under this proposal would likely result in some small increase in water yield which correlates with the reduction of the conifer over-story associated with the thinning prescription. However, other

than increased peak flows (discussed below) the "increase in fall and winter discharge from forest activities is likely to have little biological or physical significance" (*U.S.E.P.A., 1991*).

Base Flow: Outside of fog-drip zones, removal of the forest cover usually results in an increase in summer base flow; presumably due to a reduction in evapotranspiration and interception (*Harr et al., 1979*). Thus, the reduction of the conifer over-story associated with the thinning prescription would likely result in some small increase in summer water yield. Hypothetically, this action could have a beneficial indirect effect on the aquatic community of adjacent streams by increasing summer base flow. However, considering the small percentage of the watershed's coniferous forest that would be altered, this effect is not likely to be significant or measurable.

Peak Flow: Peak flows refer to the instantaneous maximum discharge associated with individual storm or snowmelt events (U.S.E.P.A.,1991). Since portions of the project area are above 1,500 feet, it can be assumed that the removal of portions of the conifer overstory would likely result in some small increase in water yield as a result of increases in snow accumulation and melting during ROS events. Once again, due to the small area considered in this action, this effect is not likely to be measurable directly. Since the direct effects on streamflow of the action alternatives in this watershed are all likely too small to be measured, the action was analyzed for its potential contribution to *cumulative effects* to peak flows, as described in the Cumulative effects analysis (p.22-24).

Project Area Stream Channels (ACSO 5)

In the short term, this proposal is unlikely to alter the current condition of channels in the project area. Minimization of direct disturbances from the proposed action (e.g. increased flows or sediment delivery) is likely to result in the maintenance of stream channels in their current condition. Over the long term, reductions in stand density would likely increase riparian and upland forest health and tree size. This could lead to increased large wood recruitment for stream channels, an important factor in proper channel function. In addition, more open stands would allow for the growth of important riparian species in the understory, such as western red cedar, which are currently suppressed. In Crabtree Creek and its tributaries, large wood structure in the channel is particularly important because it has been depleted to levels below its natural range (BLM, 2001). Large wood in the channel would ultimately slow stream velocity, increase retention of organic material, capture bedload, and improve aquatic habitat.

Project Area Water Quality (ACSO 4)

Stream Temperature: Field surveys and review of aerial photographs indicate that shading is near to full potential along all the tributaries on public lands in the project area. The headwaters of most channels in the project area have an intermittent flow regime and do not flow on the surface during most summers. These channels have very little potential to be heated by exposure to direct solar radiation. Forest density and hence shading immediately adjacent to perennial channels in the project area would be left virtually unaltered under this proposal. The stream zones were specifically placed to protect portions of tributary channels where forest shade helps to maintain the current stream temperature regime. Overall, this proposal is unlikely to have any measurable effect on stream temperatures in this watershed.

Dissolved Oxygen and pH and Conductivity: Heavy inputs of fine, fresh organic materials, particularly when combined with increases in stream temperature, sedimentation and reduced reaeration, can severely reduce the concentration of DO in small forested streams (*Hall and Lantz, 1969*). Since the proposed action is unlikely to result in any measurable increase in stream temperature or sedimentation, would not place large amounts of fine organic material in the stream and would not alter reaeration, it is unlikely that this proposal would have any measurable effect on DO levels in project area streams. Available data indicate that most forest management activities have little effect on pH or conductivity (*U.S.E.P.A., 1991*). Therefore, it is unlikely that the proposed action would have any measurable effect on pH or conductivity in project area streams.

Sediment Transport, Turbidity and Channel Substrates (ACSO 5): In most cases, management practices with the potential to accelerate erosion fall into three categories: road construction and hauling, timber harvest, and site preparation (particularly prescribed burning). BMPs and mitigation measures are proposed to eliminate and/or limit acceleration of sediment delivery to streams in the project area. As a result, it is unlikely that this proposal would lead to a measurable increase in sediment delivered to streams, stream turbidity, the alteration of stream substrate composition, or sediment transport regime.

- *Road Construction, Maintenance, and Hauling:* This proposal does not include any new road construction and therefore potential impacts from roads are a result of current road use and maintenance. Some maintenance work may include repair and /or replacement of culverts with fill excavation. In the short term, replacement of culverts and other road maintenance work carries some risk for increasing sediment delivery to local streams. The risk would be highest the first winter following repairs and would return to pre-disturbance levels within one or two winters. To minimize these risks, all work would be performed following "Best Management Practices" (RMP Appendix C, section II). Over the long term, road repairs will reduce the risk of sediment entering streams as a result of culvert and fill failure.

  The main haul routes would be on rocked forest roads to main roads either in Crabtree Creek or over the ridge in Neal Creek. Timber hauling during periods when water is flowing on roads and into ditches could potentially increase stream turbidity and suspended sediment transport with indirect detrimental effects on the streams physical and biological attributes (*Cederholm et al. 1980*). However, project design features call for all hauling to occur in "dry season" thus nearly eliminating the risk of fine sediment inputs during haul.

- *Tree Harvest and Yarding:* Skid roads, if sufficiently compacted, may route surface water and sediment into streams. However, several factors limit the potential for this to occur: 1) even if compacted, high levels of residual slash on yarding corridors would contribute to reducing the accumulation of runoff by deflecting and redistributing overland flow laterally to areas where it would infiltrate into the soil, 2) gentle to moderate hillslope gradients in this project area provide little opportunity for surface water to flow, 3) the stream zones in riparian areas have high surface roughness which functions to trap any overland flow and sediment before reaching streams, and 4) the small size of trees being yarded would limit surface disturbance to minimal levels.

Furthermore, most research to date supports the conclusion that the effectiveness of riparian buffer zones for trapping sediment before it can enter a water way reaches 100% at around 150 feet, particularly for diffuse sources such as a sale unit (CH2MHILL et al., 1999). The riparian buffers on this sale are at least 180 feet.

Areas with potential for slope instability and mass wasting were mapped in the watershed analysis. All proposed treatment units are outside of any areas mapped as highly unstable. Tree removal is not proposed on steep, unstable slopes where the potential for mass wasting adjacent to stream reaches is high. Therefore, increases in sediment delivery to streams due to mass wasting induced by loss of root strength are unlikely to result from this action. In addition, the minimal levels of surface disturbance under this proposal are unlikely to result in the concentration of runoff on mass wasting susceptible hillslopes.

No tree falling and yarding into or through streams would take place under this proposal. The stream zones on each streams would eliminate disturbance of streamside vegetation associated with this project. Therefore, it is unlikely that this proposal would increase bank erosion or channel cutting by altering channel roughness, redirecting flows or altering bank-stabilizing vegetation.
The potential for increases in stream energy due to alterations of peak flows is discussed under cumulative effects.

- *Site Preparation:* No post treatment site preparation by broadcast burning is proposed. Slash pile burning has low risk of effecting stream channels, hydrology or water quality: piles would be concentrated in small areas outside of riparian reserves.

Timing, Variability, and Duration Of Floodplain Inundation and Water Table Elevation In Meadows and Wetlands (ACSO 7)

Since the proposed action is unlikely to directly or indirectly effect stream flow in a measurable manner, it has low potential to effect floodplain inundation or water table elevation in meadows and wetlands. No mapped wetlands exist in the project area. Small seeps and areas with high water tables are excluded from treatment.

Cumulative Effects Analysis of Peak Flow Events

Cumulative effects analysis addressed the proposed thinning plus outyear sales for 2003-2006: Lulay, Church Creek, and Round Mountain. In addition, the CEA includes assumptions (e.g., that all mature forest would be harvested in this decade) about forest management on private lands in the watershed. The complete cumulative effects analysis can be found in the *Cumulative Effects Analysis of Peak Flow Events for the Roaring River Proposal* in the Roaring River EA project file.

Water available for runoff (WAR) analysis estimates potential increases in peak flows during rain on snow events due to increasing openings in the forest canopy. A level 1 analysis for increases in peak flow was conducted using the Washington State DNR watershed analysis methods (Washington Forest Practice Board, 1997).

The Roaring River proposal was analyzed using a weighting system based on the dominant precipitation type (rain, transient snow, snow), and the percent of the area with canopy cover in three different categories (open, sparse, small or large dense).

Return periods are the peak flows resulting from 24- hour precipitation amounts expected at a given level of frequency; for example once in 5 years for the 5-year return period or once in 50 years for the 50-year return period. The plus (+) sign denotes a given return period precipitation event with the addition of a heavier snow pack on the ground than average, and a warmer storm than average. This situation is often responsible for the severe flood events experienced in the Pacific Northwest. Figure 3 displays the range of peak discharge values that WAR predicts for No Action Alternative (private land only) in cubic feet per second (cfs).
Figure 4 displays the range of peak discharge values that WAR predicts for Roaring River proposal along with other public and private management activities in cubic feet per second (cfs).

Figure 3: WAR Predictions for Alternative 1 (No Action)

Alternative 1 (No Action)			
Proposed	Acres		
	Rain Zone	Transient Snow Zone	Snow Zone
Harvest:	665	1022	46
Thinning:	0	0	0

WAR Estimated Peak Discharge Summary Table (CFS)				% Change		(CFS)	% Change
Return Period	Full Forest	Existing Condition	Proposed	Over Full Forest	Over Existing	Natural Disturbance	Over Full Forest
Normal Storm Events							
Q2 =	2707	2730	2731	0.9	0.0	2739	1.2
Q10 =	4785	4820	4821	0.8	0.0	4834	1.0
Q25 =	5899	5940	5941	0.7	0.0	5956	1.0
Q50 =	6767	6811	6813	0.7	0.0	6829	0.9
Q100 =	7639	7687	7689	0.6	0.0	7706	0.9
Heavier Snow Pack And A Warmer Storm Than Average							
Q2+	4575	5842	5983	30.8	2.4	5564	21.6
Q10+	7490	9230	9419	25.7	2.0	8853	18.2
Q25+	8982	10927	11137	24.0	1.9	10508	17.0
Q50+	10116	12200	12424	22.8	1.8	11753	16.2
Q100+	11211	13406	13640	21.7	1.8	12936	15.4

Q = Discharge in cubic feet per second (CFS)

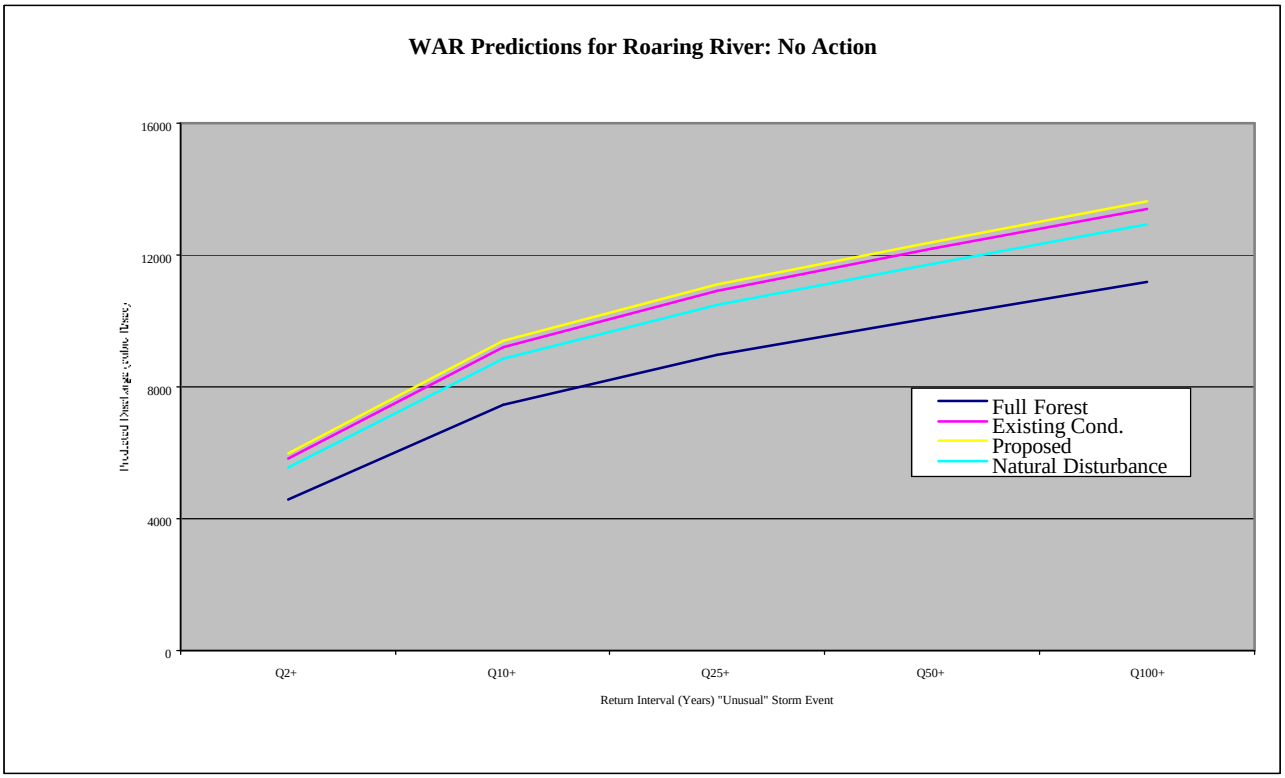
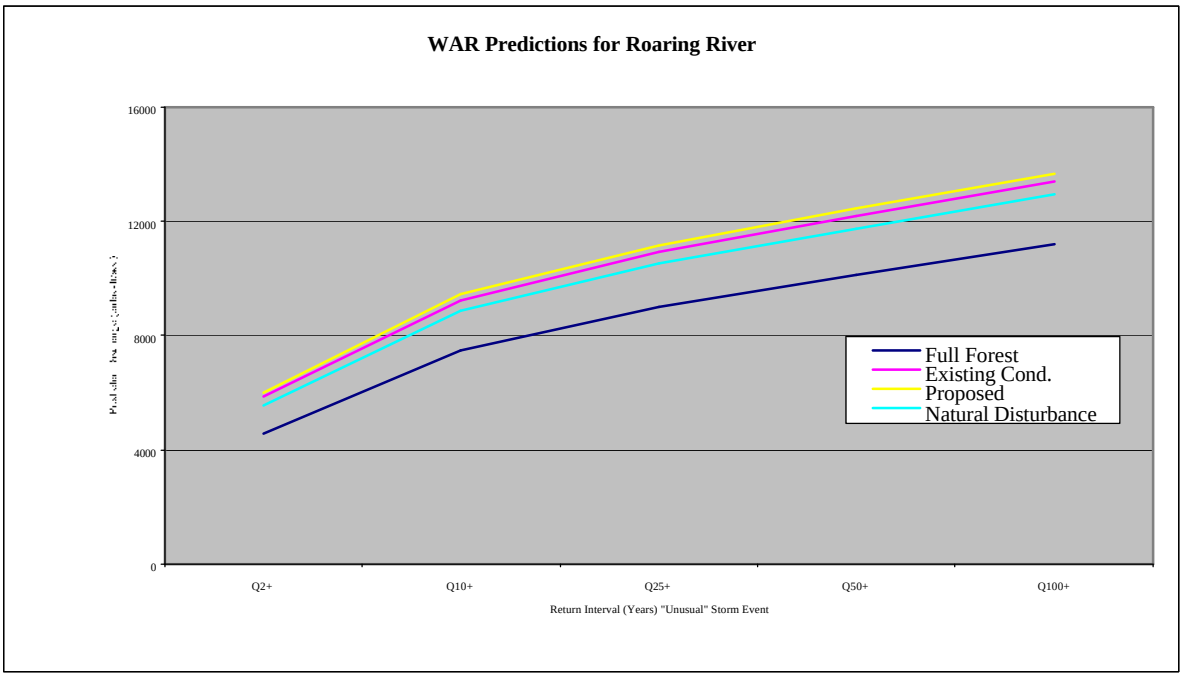


Figure 4: WAR Predictions for Alternative 2 (Proposed Action)

Alternative 2 (Proposed Action): All Ownerships			
Proposed	Acres		
	Rain Zone	Transient Snow Zone	Snow Zone
Harvest:	665	1022	46
Thinning:	200	150	0

WAR Estimated Peak Discharge Summary Table (CFS)				% Change		**(CFS)**	% Change
Return Period	Full Forest	Existing Condition	Proposed	Over Full Forest	Over Existing	Natural Disturbance	Over Full Forest
Normal Storm Events							
Q2 =	2707	2730	2731	0.9	0.0	2739	1.2
Q10 =	4785	4820	4821	0.8	0.0	4834	1.0
Q25 =	5899	5940	5941	0.7	0.0	5956	1.0
Q 50 =	6767	6811	6813	0.7	0.0	6829	0.9
Q100 =	7639	7687	7689	0.6	0.0	7706	0.9
Heavier Snow Pack And A Warmer Storm Than Average							
Q2+	4575	5842	5999	31.1	2.7	5564	21.6
Q10+	7490	9230	9441	26.0	2.3	8853	18.2
Q25+	8982	10927	11162	24.3	2.2	10508	17.0
Q50+	10116	12200	12451	23.1	2.1	11753	16.2
Q100+	11211	13406	13668	21.9	2.0	12936	15.4

Q = Discharge in cubic feet per second (CFS)



In summary, the analysis found low sensitivity to increases in peak flows and low potential risks for aquatic resources for normal storm events. It found an "indeterminate" risk for "unusual" peak flow events associated with a 2-yr+ and greater return interval storm event.

The indeterminate rating does not require that the actions considered under this proposal be delayed or postponed. Rather, it points to the possibility of impacts to the aquatic ecosystem in these watersheds at *some point during the ten-year analysis period*. In fact, the WAR analysis found that the 20% increase in a 2-yr peak flow (given as a threshold value for considering the effects of increased bed mobility and bed scour) has already been exceeded under current conditions. When public actions are separated from assumed private actions in the watershed, WAR estimated only a 0.3% increase in 2-yr + peak flows over current conditions due to the actions taken on BLM lands during the next decade. Thus, private actions alone are likely to push WAR values higher in this watershed irrespective of which alternative is chosen.

Meanwhile, since LWD and pool habitat are "at risk" in these streams long term LWD supply to streams is likely the most critical factor for maintenance of aquatic habitat in these watersheds that we can actively manage. Since this proposal would not alter riparian forest condition, both alternatives are expected to maintain LWD recruitment at current levels.

Project 2 (Riparian Treatments)

Soils: The only proposed action within riparian areas is girdling and/or falling of up to eight trees per acre within riparian treatment areas (i.e., units R-1, R-2, R-3 and R-4). Therefore, since there would be no ground disturbance from this activity, no site-specific impacts would result.

Hydrology and Water Quality: Small openings in the canopy are a natural component of forest ecology as various local disturbances (beaver and animal browsing, disease, blow down, etc.) affect the riparian forest. Girdling and falling selected trees in the riparian reserve mimicks these disturbances and has low potential for directly effecting stream channels, hydrology or water quality in a measurable manner.

Fisheries and Aquatic Habitat

Alternative 1: No Action Alternative

Current conditions, as described in Chapter 3 would continue. The No Action alternative would have no effect on Fisheries or Aquatic Habitat.

Alternative 2: Proposed Action

Project 1 (Timber Management)

The riparian reserve widths of one site potential tree height (180 feet on each side of the stream, based on specific site characteristics) on the streams adjacent to the sale units would be adequate to protect the aquatic and riparian resources and habitat from any effects of the proposed timber harvest. The reserves would also be sufficient to protect the aquatic and riparian resources downstream in Crabtree Creek and in the South Santiam River from effects of the proposed action.

Threatened and Endangered and Special Attention Species: A determination has been made that this proposed project would have 'no effect' on Upper Willamette River steelhead trout or Upper Willamette River Chinook salmon (p. 13,A-8).

Project 2 (Riparian Treatments)

The girdling and/or falling of approximately eight trees per acre, clumped and scattered, on approximately 37 acres within the Riparian Reserves, but outside the stream zone, would have no impact on fisheries, aquatic organisms or habitat.

Vegetation

Alternative 1: No Action Alternative

Forest Productivity: Over time natural mortality would occur as suppressed and intermediate trees died out. This would have the affect of thinning the stand naturally. As the trees died out and eventually fell to the forest floor we would see a build up of dead and down material. The dwarf mistletoe infection would continue to develop and spread. This spread is expected to have a beneficial effect on forest stand diversity and an adverse effect on forest productivity in the context of future forest products.

Riparian Habitat: Canopy uniformity and structural simplicity would remain as it is. Existing small gaps would shrink in size due to ongoing crown expansion, and there is little in the way of snow breakage occurring or other destructive natural agents to cause minor disturbance events that would add needed structural diversity. Decadence and dead wood habitat would remain scarce for possibly many decades.

Special Status/Attention and Invasive Species: Alternative 1 would have no effect on these resources. Current conditions for these Resources would continue (pp. 13 -15).

Alternative 2: Proposed Action

Project 1 (Timber Management)

Forest Productivity[5]: Under this alternative all four units would be commercially thinned. The stand would be thinned from below by removing suppressed, intermediate, and some co-dominant trees. The remaining stand would consist of the largest and best trees left to grow until final harvest in 30 or 40 years. In addition an effort would be made to remove mistletoe-infected trees. The number of trees in the stand would drop from around 190 pre-harvest to a range of 90-120 trees per acre post harvest. Thinning would result in increased average stand diameters, distributing stand growth in the remaining trees.

Riparian Reserve Habitat: No thinning would take place within Riparian Reserves, therefore current habitat conditions would continue as described in Chapter 3 (pp. 13-15).

Special Status and Special Attention Species (including Survey and Manage): Due to the protection buffers that would be established around the *Corydalis aquae-gelidae* (COAQ) population and all stream channels within the project area, no adverse effect to the COAQ, the microclimate surrounding it, or any potential habitat located within the creek channel or riparian areas is anticipated.

Invasive Species: No significant increase in the noxious weeds identified during the field surveys is expected to occur. An increase in the overall number of these species would likely occur immediately following any ground disturbing or light increasing activity associated with the planned timber sale. Any increase that does occur should be short lived due to revegetation by native species in areas of high light and ground disturbing activities.

Project 2 (Riparian Reserve Treatments)

Project 2 would have no measurable effect on forest productivity. With retention of a protection buffer on *Corydalis aquae-gelidae*, no effects to this species or its potential habitat are anticipated.

Riparian Reserve Habitat: The treatment as proposed would add and enhance elements of structural diversity to portions of Riparian Reserve in T.11S., R1E., Section 1 that were simplified by past high yield forestry practices. Small canopy gaps would be created in a dense and uniform canopy layer. This would allow increased light levels to reach the forest floor and stimulate understory vegetation development.

Large open grown trees would be released and allowed to continue to grow in an open environment. This would allow for continued crown development and help to maintain a high live crown ratio. The surrounding tree crowns are currently closing the limited open growing space, and the lower branches of the selected "wolf" trees are dying. Opening up these selected "wolf" trees is expected to slow that process.

[5] Forest Productivity described here is in the context of Timber Management Objectives.

Where mostly Douglas-fir trees are treated, local Douglas-fir bark beetle population increases may be expected as a result of these actions. However, because of the small scale of the proposal, and by following the recommended guidelines to minimizing potential bark beetle damage, the risk of sustaining significant adverse effects to residual green trees is considered to be low to moderate with this proposal. In addition, there are many treatment sites where western hemlock would be the main species treated. In those cases, the Douglas-fir bark beetle would not be an issue.

Invasive species: No significant increase in the noxious weeds identified during the field surveys is expected to occur. Any increase that does occur should be short lived due to revegetation by native species in areas of increased light due to the resulting gaps in the canopy.

Terrestrial Wildlife

Alternative 1: No Action

Snags and Coarse Woody Debris (CWD): Natural processes would continue, and competition among overstory trees would continue. Due to past management in these stands, much of the material that would have developed into snags and CWD was removed. Large diameter material over 20 inches would be recruited over decades, and snags and CWD would be generated over long periods of time. Existing material would remain intact, but continue to decay.

Late Successional Habitat: Natural processes would continue as described in Chapter 3 (p. 15).

Federally Listed Species (northern spotted owl): There would be no change to federally listed species or their habitat. Habitat conditions would remain as described in Chapter 3 (p.15).

Bureau Sensitive, Special Attention (Including Survey and Manage), or Other Species of Concern: There would be no effect to Bureau Sensitive, Special Attention (including Survey and Manage), or other species of concern. Habitat conditions would remain as described in Chapter 3 (p.15).

Alternative 2: Proposed Action

Project 1 (Timber Management)

Snags and Coarse Woody Debris (CWD): In the short term (10 to 20 years), it is anticipated that there would be some loss of current snags. Loss or damage to some CWD is also anticipated. This may have an indirect effect on species such as salamanders, mollusks and woodpeckers that utilize this material for foraging and cover. Over the long term (greater than 20 years) as the thinned stand matures the residual trees would increase in size and potentially be recruited as snags, culls and CWD. Adjacent stands including riparian reserves would provide refugia for those species.

Late Successional Habitat: The project as proposed would have no direct effect on late successional habitat. A long-term potentially positive effect would be that the thinning would

promote accelerated growth of residual (leave) trees and the development of an understory of conifer trees, which all lead to a larger more diverse stand – sooner than not thinning.

Special Status/Special Attention Species: None of the alternatives are predicted to result in a trend toward federal listing, loss of population viability, or elevation of status to any higher level of concern.

Federally Listed Species

Northern spotted owl: In the short term, 140 acres of dispersal habitat would be degraded resulting in a *"may affect, not likely to adversely affect"* determination. It is anticipated that the degraded dispersal habitat would regain a closed canopy condition within 10 to 20 years.

A more open canopy would facilitate the growth of understory species, which in the long term would help provide the complexity necessary for the formation of suitable spotted owl habitat.

Bald Eagle: The Roaring River proposal, as designed, would have no effect on bald eagles or their habitat. Bald eagles have never been observed in the Roaring River area.

Bureau Sensitive, SEIS Special Attention, and Other Species of Concern

Birds, Amphibians, and Bats: In the short term, retention of existing snags and CWD would reserve habitat for primary excavators, amphibians and bat species. Direct adverse impacts to snags and CWD due to logging and site preparation could have short-term adverse impacts on these species. The impact to these species is expected to be minimal due to the small size and low frequency of snags and CWD within the units.

Microhabitat drying is anticipated to occur as canopies are opened up. It is anticipated to be minimal due to the high green tree retention in commercial thinnings. Direct impacts to existing snags and CWD due to logging and site preparation are anticipated to be low. Resulting in only minor impacts to habitat for primary excavators (woodpeckers), amphibians, and bat species. The drying could result in the loss of individuals; however, adjacent non-thinned areas should provide adequate refugia for the species' and as a source for repopulation. This short-term effect is anticipated to last from 10 to 20 years at which time the canopy should be in a closed condition. Riparian Reserves would adequately protect aquatic amphibians, and provide protection for bats, which forage over open water and in riparian areas.

As a result of this alternative, 140 acres of marginally suitable habitat for goshawks would be degraded (short term) through the reduction of canopy closures below current levels.

Red Tree Vole: Although no red tree voles were detected during surveys, the proposed thinning is considered to be marginal red tree vole habitat (EA p. 16). Assuming that Douglas fir is a preferred leave species then the short term (10 to 20 years) effect may be a degradation of suitable habitat with the long-term effect being positive as the Douglas firs increase in size, becoming a more dominant component of the stand. Riparian Reserves and areas dropped or not included in the proposal would continue to provide habitat for red tree voles.

Survey and Manage Mollusks: There may be a loss of habitat for mollusks that were not detected. Riparian Reserves and areas dropped or not included in the proposal would continue to provide habitat for mollusks. Additional CWD as well as crown cover from residuals would provide shade and microclimates sufficient for mollusk species.

Road Densities:

There would be no net increase of open road densities as a result of this proposal. Road densities would remain at current levels of approximately 4.4 miles per section. Effects to wildlife would remain the same.

Project 2 (Riparian Treatments)

Habitat Features: Creating snags would impart an element of increased decadence to the landscape. Felling trees would add an element of Class I coarse woody debris to the Riparian Reserves where little hard coarse woody debris exists. Creating wolf trees would add further diversity within the Riparian stands.

Bureau Sensitive, SEIS Special Attention, and Other Species of Concern: Riparian Reserve treatments are expected to have a beneficial effect on species dependent on snags, coarse woody debris, and wolf trees.

Fire and Fuels

Alternative 1: No Action

Current conditions, as described in Chapter 3, would continue.

Alternative 2 (Proposed Action)

Project 1 (Timber Management)

Fire Hazard

Fuel loadings in the treatment areas are considered normal for young stands ready fro commercial thinning. The present fuel loadings have a low to moderate hazard of wildfire depending on the weather and drought status for any given fire season.

Behave-Plus, a fire behavior modeling program was used to predict the fire behavior if a fire were to start in the sale area. The first prediction used Fuel Model 8, which is a closed canopy stand of short-needle conifers, (pre-treatment). The second prediction run used Model 11 (light logging slash) with lower fuel moistures and higher wind speeds to simulate a more open canopy, which subjects fuels to more drying and higher wind speeds. The Behave-Plus analysis is further described in *Roaring River: Fuels Management /Fire Ecology Interdisciplinary Team Review* in the Roaring River EA project file.

The outputs from the two fuel types show that a wildfire under the modeled weather conditions could be handled with hand crews and equipment (dozers and engines). Using Behave-Plus to predict the size of a unimpeded fire after 2 hours shows a 7.5 acre fire size in Fuel Model 11. Two hours is the estimated time it would take for fire fighting forces to get on scene, provided no one was at the site when the fire started.

Even though the consequences (hazard) of a wildfire in a timber-harvested unit are more than from wildfire consequences in an untreated stand, the area involved is not significant. The real question that has to be asked is that of ignition sources (risk). What is the risk for the geographical area associated with the proposed action?

Fire Risk (Ignition Sources)

The predominant natural ignition source for wildfire in Oregon is lightning. The sale area however, is not located in a geographical area conducive to lightning fires. It does occur rarely and is usually accompanied by sufficient rainfall to eliminate any fire start.

The other source of ignition is human related. The general area in and around the sale area receives a moderate amount of recreational use especially during deer and elk hunting seasons. Historically, the heavy recreational use has not produced wildfires. To minimize any human related fire starts from driving there would be a twenty-five foot fuel reduction corridor on either side of Roads # 11-1E-1.3, 10-1E-33 and 11-1E-4.1.

Project 2 (Riparian Treatments)

Due to the small number of trees affected, this project is not expected to affect fuel levels beyond current conditions.

Recreation, Rural Interface and Visual Resources

Alternative 1: No Action

Recreation and Rural Interface Resources: With the exception of unexpected changes (i.e. wildfire or disease etc.) the proposed units would continue to provide a forest setting for dispersed recreational activities.

Visual Resources: With the exception of unplanned changes (i.e. wildfire or disease etc.) no modifications to the landscape character of the proposed units would be expected to occur. Modifications to the landscape character in the general area around the units would still be expected, as a result of harvesting activities on other lands.

Alternative 2 (Proposed Action)

Project 1 (Timber Management)

Recreation and Rural Interface Resources: Recreational use of the proposed units would be restricted in the short term during the thinning operation. A forest setting would still be maintained, and vegetation disturbed by logging activities would be expected to return within five years. The thinning of the units would open up the stand, which may make it easier to walk through the units. Recreational use is expected to remain low.

Visual Resources: The thinning of the proposed units should comply with VRM Class IV Management Objectives. A forested setting would remain. Some short-term disturbance would be observable when directly adjacent to the units. Evidence of disturbance from the thinning activities would be less observable within five years as understory vegetation returns and the remaining stand continues to mature. No cumulative impacts to visual resources are expected.

There would also be some short-term (days) decline in visual quality as a result of the smoke created if any burning of debris occurs. Any burning would be done in compliance with state smoke management regulations.

Project 2 (Riparian Treatments)

Recreation and Rural Interface Resources: With the exception of unexpected changes (i.e. wildfire or disease etc.) the proposed units would continue to provide a forest setting for dispersed recreational activities.

Visual Resources: With the exception of unplanned changes (i.e. wildfire or disease etc.) no modifications to the landscape character of the proposed units would be expected to occur. Modifications to the landscape character, in the general area around the treatment areas, would still be expected as a result of harvesting activities on other lands.

Comparison of Effects by Alternatives

Table 5: Comparison of Effects by Alternatives

Resource		Alternative 1 (No Action	Alternative 2 (Proposed Action)
Soils and Water	**Soils (pp.18 -19)**	Current compaction from skid roads and landings exists on approximately 35% of project area. At present time approximately 50% of compaction has recovered. Full recovery is expected when the stand has reached CMAI (culmination of mean annual increment) in approximately 30 years.	Using existing skid roads, and limiting yarding activities to slopes < 35% would limit new compaction associated with ground based yarding to < 10 percent. After regeneration harvest of these stands (in approximately 40 years), skid roads would be decommissioned, reducing soil compaction from skid roads to < 5 percent.
		Current conditions, as described in the Affected environment would continue.	There would be no ground disturbance associated with girdling/falling eight trees per acre. Therefore no site-specific impacts would result.
	Water (pp.19-26)	Under this alternative the existing water quality conditions, stream flows, and channel conditions at the project site would continue their current trends of change.	Measurable *direct and indirect* effects to stream flow, channel function, and water quality as a result of the action alternative are of low probability. Alternative 2 is unlikely to alter the current condition of the aquatic system either by affecting its physical integrity, water quality, sediment regime or in-stream flows. No harvest would take place within Riparian Reserves. Vegetative roughness within full leave riparian reserves is expected to absorb runoff before reaching streams. Nearly all riparian forest cover is retained thereby maintaining riparian microclimate conditions and protecting streams from increases in temperature. *Cumulative Effects:* The Water Available for Runoff (WAR) modeling conducted for the Crabtree Creek 6th field watershed in which proposed project units are located predicted that for normal storm events, no increases in peak flow (relative to a fully forested condition) are expected under the proposal. For unusual storm events (Q2+) the WAR analysis predicted a potential 0.3% increase in 2-yr + peak flows over current conditions, cumulatively in all the streams in the analyzed subwatershed due to the actions taken on BLM lands during the next decade.
			Girdling and falling selected trees in the riparian reserve mimicks these disturbances and has low potential for directly effecting stream channels, hydrology or water quality in a measurable manner.

Projects	
	Project 1 (Timber Management)
	Project 2 (Riparian Treatments)
	Both Projects

Resource	Alternative 1 (No Action	Alternative 2 (Proposed Action)
Fisheries and Aquatic Habitat (p. 26 - 26)	Current aquatic conditions would continue.	No measurable change in aquatic habitat associated with this project is expected. Full leave riparian reserves, no road construction, slopes less than 35%, and limiting tractor operations to designated skid roads should reduce the risk of runoff reaching streams to minimal levels. There would be no change in stream shade for either project. *Fisheries:* A determination has been made that this proposed project would have 'no effect' on Upper Willamette River steelhead trout or Upper Willamette River Chinook salmon (*p A-.8*). Generally, the 'no effect' determination is based on the distance upstream of project activities from ESA listed fish habitat (~5 miles), and project design criteria that include no harvest activity within Riparian Reserves, dry season hauling of timber and post-project leave tree densities of 90-120 trees per acre.
		The girdling and/or falling of approximately eight trees per acre, clumped and scattered, on approximately 37 acres within the Riparian Reserves but outside the stream zone would have no impact on fisheries, aquatic organisms or habitat.
Vegetation, including Riparian Reserves	*Forest Productivity, Special Status Species:* Current conditions would continue. Buildup of dead and down wood from natural mortality	*Forest Productivity:* Tree size and stand growth is expected to increase. *Special Status Species*: No effect is expected due to retention of a no entry buffer.
	Canopy uniformity and structural simplicity would remain as it is. Existing small gaps would shrink in size due to ongoing crown expansion. There is little in the way of snow breakage occurring or other destructive natural agents to cause minor disturbance events that would add needed structural diversity. Decadence and dead wood habitat would remain scarce for possibly many decades.	The treatment as proposed would add and enhance elements of structural diversity to portions of Riparian Reserve in T.11S., R1E., Section 1 that were simplified by past high yield forestry practices. Small canopy gaps would be created in a dense and uniform canopy layer. This would allow increased light levels to reach the forest floor and stimulate understory vegetation development. Large open grown trees would be released and allowed to continue to grow in an open environment. This would allow for continued crown development and help to maintain a high live crown ratio. The surrounding tree crowns are currently closing the limited open growing space, and the lower branches of the selected "wolf" trees are dying. Opening up these selected "wolf" trees would slow that process. Creating snags would impart an element of increased decadence to the landscape. Felling trees would add an element of Class I coarse woody debris to the Riparian Reserves where little hard coarse woody debris exists. Many wildlife species rely on this resource to help fulfill their life history requirements.
Terrestrial Wildlife	Current conditions would continue.	Short term loss of snags and CWD from harvest activities. Future fain of larger snags as a result of increased tree growth on retained trees. May affect, not likely to adversely affect spotted owl due to short term degrading of dispersal habitat. Microhabitat drying associated with opening canopy is reduced by high green tree retention associated with thinning. Degrade marginal red tree vole habitat (no redtree voles detected during surveys)
		See Vegetation (riparian reserves) in the above section.

Resource	Alternative 1 (No Action	Alternative 2 (Proposed Action)
Fire Fuels	Sustained low to moderate fire hazard	Retaining a 25 ft. fuels reduction corridor would reduce fire risk.
		No effects to fuels are anticipated.
Recreation visual, rural	Current conditions would continue.	Recreation access would be restricted during harvest Effects to visuals would decrease as understory vegetation grows and stand continues to mature.
		No effect

Conformance With Land Use Plans, Policies, and Programs

All alternatives, unless otherwise noted, are in conformance with the following documents that provide the legal framework, standards, and guidelines for management of BLM lands in the Cascades Resource Area:

- *Salem District Record of Decision and Resource Management Plan*, May 1995.
  - **ACS Objectives and Riparian Reserves:** All alternatives are predicted to result in the maintenance of ACS objectives (p.4). Riparian Reserves in the sale area would be established to the standards for streams and wetlands outlined in the *Salem District Record of Decision (1994)* on pages C-30 and C-31. Riparian Reserve boundaries would be to ecological breaks, geologically stable breaks, or the minimum slope distances on each side of the stream or wetland boundary. Reference Instruction Memorandum OR-95-75 for guidance on determination of site potential trees.
  - **Special Status/Attention Species and Habitats:**
    - Required surveys have taken place for Special status /special attention species (including Surveys for Appendix B-1 "Survey and Manage (S&M) Species" and "protection buffers" species).
    - All alternatives are predicted not to result in a trend toward federal listing, loss of population viability, or elevation of status to any higher level of concern (EA p. 29).
  - **Visual Resources:** Alternative 2 is consistent with the visual resource management objectives (EA p. 1).
  - **Socioeconomic:** Alternative 2 provides social and economic benefits to local communities through contract work associated with the project. Alternative 1 appears not to be in conformance because it does not contain a provision for contract work that could contribute to the local economy.
  - **Invasive Weeds:** No significant increase in the noxious weed identified during the field surveys is expected to occur. (EA p. 27).
  - **Best Management Practices (BMPs):** The proposed action contains applicable Best Management Practices described in the RMP, Appendix C. These BMPs have been designed to be in compliance with the Clean Water Act.
- *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl,* April 1994.
  - Pursuant to the Salem District Resource Management Plan/Final Environmental Impact Statement, page 4-96, the Salem District RMP is supported by and consistent with this document. Since the action alternatives are consistent with the RMP, these alternatives are also consistent with the Record of Decision.
  - Watershed Analysis: The Crabtree Creek Watershed Analysis was completed in July 2001. The watershed analysis partially defines the purpose of and need for action (EA p. 2).
- *Record of Decision for Amendments to the Survey and Manage, Protection Buffer, and Other Mitigation Measures Standards and Guidelines (ROD, January, 2001) and the Final Supplemental Environmental Impact Statement for Survey and Manage, Protection Buffers, and Other Mitigation Measures in the Northwest Forest Plan, November 2000.* Alternative 2 follows survey protocols described in this document.
- *Implementation of 2001 Survey and Manage Annual Species Review, June 2002.* Alternative 2 follows survey protocols described in this document.

CHAPTER 5 - PUBLIC INVOLVEMENT, CONSULTATION, MAJOR SOURCES, AND INTERDISCIPLINARY TEAM MEMBERS

Public Involvement

Public scoping for this project is described in Chapter 1 (p. 3). The EA and FONSI will be made available for public review from March 19 to April 18, 2003. The notice for public comment will be published in a legal notice by local newspapers of general circulation (Albany Democrat Herald); sent to those individuals, organizations, and agencies that have requested to be involved in the environmental planning and decision making processes; and posted on the Internet at http://www.or.blm.gov/salem/html/planning/index.htm under Environmental Assessments. Comments received in the Cascades Resource Area Office, 1717 Fabry Road SE, Salem, Oregon 97306, on or before April 18, 2003 at 4:00 PM, Pacific Daylight Saving Time, will be considered in making the final decisions for these projects. Office hours are Monday through Friday, 7:30 A.M. to 4:00 P.M., closed on holidays.

Endangered Species Act (ESA) Consultation

Terrestrial Wildlife: The Roaring River proposal was submitted for Formal Consultation with U.S. Fish and Wildlife Service on September 3, 2002. Consultation with the USFWS resulted in a May Affect, Not Likely to Adversely Affect Determination for northern spotted owl. The proposed action will follow all applicable terms and conditions from the Biological Opinion dated February 27, 2003 [BO# 1-7-03-0008].

Fish: Consultation with NOAA Fisheries is required for projects that 'may affect' listed species. A determination has been made that this proposed project would have 'no effect' on Upper Willamette River steelhead trout or Upper Willamette River Chinook salmon (p. A-8). Generally, the 'no effect' determination is based on the distance upstream of project activities from ESA listed fish habitat (~5 miles), and project design criteria that include no harvest activity within Riparian Reserves, dry season hauling of timber and post-project leave tree densities of 90-120 trees per acre.

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Interdisciplinary Team Members

Resource	Specialist	Initials	Date
Botany TES and Special Attention Plant Species	Terry Fennell	TGF	3/19/03
Cultural Resources	Fran Philipek	FMP	3/18/03
Engineering	Steve Ditterick	SJD	3-18-03
Fire and Fuels	Sam Caliva	SAC	3/18/03
Fisheries	Dave Roberts	DMR	3/18/03
Hydrology/Water Quality	Patrick Hawe	PH	3-18-03
Logging Systems	Steve Bauman	SER	3 18 03
Recreation, Rural Interface and Visual Resources	Laura Graves	LJG	3-18-03
Riparian Ecology	Dave Rosling	DER	3/19/03
Silviculture	Colin Rabe	CR	3/19/03
Soils	John Caruso	JRC	3/18/03
Wildlife TES and Special Attention Animal Species	Jim Irving	JMI	3/19/03

EA APPENDICES

Appendix 1: Environmental Elements

In accordance with law, regulation, Executive Order and policy, the interdisciplinary team reviewed the elements of the environment to determine if they would be affected by the proposed action (i.e., Alternative 2) described in Chapter 2. The following two tables summarize the results of that review. Chapter 4 contains a discussion of the environmental effects.

Table 6 lists the critical elements of the environment, which are subject to requirements specified in statute, regulation, or Executive Order. This table also contains the interdisciplinary team's predicted environmental effects per element if the activities of proposed action (i.e., Alternative 2) described in Chapter 2 of the Environmental Assessment were implemented.

Table 6: Critical Elements of the Environment

Critical Elements Of The Environment	**Environmental Effect**	**Interdisciplinary Team's Comments**
Air Quality	Minimal Effect	Burning of piles would be done in accordance with "The Oregon Smoke Management Plan". Generally speaking, piles would be burned when the surrounding vegetation and activity fuels would not support active burning at the close of a protracted east wind event.
Areas of Critical Environmental Concern	None	There is no ACEC located within the project area.
Cultural, Historic, Paleontological	None	There are no known cultural sites located within the project area. No cultural or archeological resources are known or expected to be present in the proposed project area.
Environmental Justice	Minimal Effect	The proposed action is not anticipated to have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.
Flood Plains	Minimal Effect	No timber harvest would take place within Riparian Reserves
Hazardous or Solid Wastes	None	
Invasive, Nonnative Species	Effects to invasive, nonnative species are described in Chapter 4 of the EA (EA p. 27).	
Native American Religious Concerns	None	No Native American religious concerns were identified during the public scoping period.
Prime or Unique Farm Lands	None	There are no prime or unique farmlands located within the project area.
Threatened or Endangered Plant Species or Habitat	None	There are no known threatened or endangered plant species or habitat located within the project area.

Critical Elements Of The Environment	Environmental Effect	Interdisciplinary Team's Comments
Threatened or Endangered Wildlife Species or Habitat	Effects to Threatened or Endangered wildlife species or habitat are described in Chapter 4 of the EA (EA p. 15).	
Threatened or Endangered Fish Species or Habitat	Effects to Threatened or Endangered fish species or habitat are described in Chapter 4 of the EA (EA p. 26, 37).	
Water Quality (Surface and Ground)	Effects to water quality are described in Chapter 4 of the EA (EA p. 19-26).	
Wetlands/Riparian Zones	Minimal Effect	No timber harvest would take place within Riparian Reserves
Wild and Scenic Rivers	None	There is no wild and scenic river located within the project area.
Wilderness	None	There is no wilderness located within the project area.

Table 7 lists other elements of the environment that are subject to requirements specified in law, regulation, policy, or management direction. This table also contains the interdisciplinary team's predicted environmental effects per element if the activities of proposed action (i.e., Alternative 2) described in Chapter 2 of the Environmental Assessment were implemented.

Table 7: Other Elements of the Environment

Elements Of The Environment	Environmental Effect	Interdisciplinary Team's Comments
Adverse Impacts on the National Energy Policy	None	This project does not propose any activities related to energy development, production or distribution.
Wildlife Species/Habitat: Special Status and Special Attention, (including Survey and Manage)	Effects to special status and special attention wildlife are described in Chapter 4 of the EA (EA p. 29).	
Fish Species with Bureau Status including critical habitat	No fish were detected in the streams adjacent to the project area. (EA p. 13). Effects to aquatic habitat are described in Chapter 4 of the EA (EA p. 26).	
Key Watershed	None	The project is not within a key watershed.
Land Uses (including mining claims, mineral leases, etc.)	None	There are no known mining claims, mineral leases, etc. located within the project area.
Minerals	None	The proposed action does not include the extraction of any mineral resource.
Municipal Watershed	Project lies in a portion of City of Jefferson's municipal watershed. Effects to water quality are described in Chapter 4 of the EA (EA p. 19-26).	
Plant Species/Habitat: (including Survey and Manage	Effects to Special Status/ Attention species are described in Chapter 4 (EA p. 26)	

Elements Of The Environment	Environmental Effect	Interdisciplinary Team's Comments
Recreation	Effects to recreation are described in Chapter 4 of the EA (EA p. 31).	
Rural Interface Areas	Effects to Rural Interface Areas are described in Chapter 4 of the EA (EA p. 31).	
Soils	Effects to soils are described in Chapter 4 of the EA (EA p. 18).	
Special Areas (Within or Adjacent)	None	There are no special areas located within or adjacent to the project area.
Visual Resources	Effects to visual resources are described in Chapter 4 of the EA (EA p. 32).	
Water Resources (including Aquatic Conservation Strategy Objectives, beneficial uses [Salem FEIS Chapter 3-9], DEQ 303(d) listed streams, water temperature, sedimentation, water quantity, etc.)	Effects to water resources are described in Chapter 4 of the EA (EA pp. 19-26). Also see Appendix 2 for an evaluation of the project with regard to Aquatic Conservation Strategy objectives (EA p. A-3-8).	

Appendix 2 - Aquatic Conservation Strategy Objectives

Table 8: Documentation of the Roaring River Projects' Consistency with the Four Components of the Aquatic Conservation Strategy

ACS Component	Project Consistency
Component 1 - Riparian Reserves	The Riparian Reserve boundaries would be established consistent with direction from the Salem District Resource Management Plan (p. 10). Additionally, maintaining canopy cover along all streams and the wetlands would protect stream bank stability and water temperature. Additionally, there would be no road construction within the Riparian Reserve.
Component 2 - Key Watershed	The projects are located within the Crabtree Creek watershed, which is not a designated key watershed.
Component 3 - Watershed Analysis	The Crabtree Creek Watershed Analysis document was completed in July 2001. Both projects are consistent with the recommendations in the Watershed Analysis.
Component 4 - Watershed Restoration	Increasing stand diversity in Riparian Reserves address this component.

Table 9: Documentation of the Roaring River Projects' Consistency with the Nine Aquatic Conservation Strategy Objectives

ACS Objective 1. Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

Alternative 1: No Action

The No Action alternative would maintain the development of the existing vegetation and associated stand structure at its present rate. The current distribution, diversity and complexity of watershed and landscape-scale features would be maintained. *Does not retard or prevent the attainment of ACS Objective 1.*

Alternative 2: Proposed Action

- Project 1 (Timber Management):

  Over time the proposed treatments are expected to result in forest stands that exhibit attributes typically associated with stands of a more advanced age and stand structural development. (Larger trees, a more developed understory, an increase in the number, size and quality of snags and down logs). The net effect of this would be a more diverse and structurally complex landscape that would help to protect and enhance adjacent aquatic ecosystems. *Does not retard or prevent the attainment of ACS Objective 1.*

- Project 2 (Riparian Reserve Treatments):

  The *Crabtree Watershed Analysis* (CWA) identifies that past management has altered much of the landscape, including Riparian Reserves. The net result is that late-successional stand structure and the habitat it provides is limited across the watershed. It also recognizes that there is a general scarcity of standing and down dead wood in the early stages of decay across the watershed. Riparian areas with young conifer stands are common in all of the SWBs, but are most prevalent in the Roaring River and South Fork Crabtree SWBs (CWA p. 7-10). By treating the portions of the Riparian Reserves that are designated for creating up to 8 snags per acre we are afforded the opportunity to restore to a small part of the watershed some of the structural attributes that are lacking due to past management. This added diversity would help to restore some complexity to a simplified Riparian Reserve network. *Does not retard or prevent the attainment of ACS Objective 1.*

ACS Objective 2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. The network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian dependent species.

Alternative 1: No Action

The No Action alternative would have little effect on the connectivity of those features except that temporally restoration would occur over a longer period of time. The current condition of connectivity would be maintained. *Does not retard or prevent the attainment of ACS Objective 2.*

Alternative 2: Proposed Action

- Project 1 (Timber Management)

  The proposed action would have little direct effect on connectivity between watersheds due to the discontinuous ownership patterns that exist. However, by restoring stand structural elements that provide habitat and refugia, it is anticipated that it would help to strengthen local connectivity within the watershed. *Does not retard or prevent the attainment of ACS Objective 2.*

- Project 2 (Riparian Treatments)

  The proposed Riparian Reserve treatments would have little direct effect on connectivity between watersheds due to the discontinuous ownership patterns that exist. However, by restoring stand structural elements that provide habitat and refugia, it is anticipated that it would help to strengthen local within watershed connectivity. *Does not retard or prevent the attainment of ACS Objective 2.*

ACS Objective 3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.

Alternative 1: No Action

The current condition of the physical integrity of the aquatic system would be maintained. *Does not retard or prevent the attainment of ACS Objective 3.*

Alternative 2: Proposed Action

- Project 1 (Timber Management)
  This proposal is unlikely to alter the current condition of channels in the project area. Minimization of direct disturbances from the proposed action (e.g. increased flows or sediment delivery) is likely to result in the maintenance of stream channels in their current condition.(EA p. 20). *Does not retard or prevent the attainment of ACS Objective 3.*
- Project 2 (Riparian Treatments)
  With the retention of a stream zone, the current condition of the physical integrity of the aquatic system would be maintained. *Does not retard or prevent the attainment of ACS Objective 3.*

ACS Objective 4. Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

Alternative 1: No Action

The current condition of water quality would be maintained. *Does not retard or prevent the attainment of ACS Objective 4.*

Alternative 2: Proposed Action

- Project 1 (Timber Management)
  Stream zones were specifically placed to protect portions of tributary channels where forest shade helps to maintain the current stream temperature regime. Overall, this proposal is unlikely to have any measurable effect on stream temperatures in this watershed. (EA p.20). BMPs and mitigation measures are proposed to eliminate and/or limit acceleration of sediment delivery to streams in the project area. As a result, it is unlikely that this proposal would lead to a measurable increase in sediment delivered to streams, stream turbidity, the alteration of stream substrate composition, or sediment transport regime. (EA p 21). Since the proposed action is unlikely to result in any measurable increase in stream temperature or sedimentation, and would not place large amounts of fine organic material in the stream, it is unlikely that this proposal would have any measurable effect on dissolved oxygen levels in project area streams (EA p. 21). D*oes not retard or prevent the attainment of ACS Objective 4.*
- Project 2 (Riparian Treatments)
  Since there would be no ground disturbance from this activity, no effects to water quality are expected. D*oes not retard or prevent the attainment of ACS Objective 4.*

ACS Objective 5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

Alternative 1: No Action

The current condition of the sediment regime would be maintained. *Does not retard or prevent the attainment of ACS Objective 5.*

Alternative 2: Proposed Action

- Project 1 (Timber Management)

  BMPs and mitigation measures are proposed to eliminate and/or limit acceleration of sediment delivery to streams in the project area. As a result, it is unlikely that this proposal would lead to a measurable increase in sediment delivered to streams, stream turbidity, the alteration of stream substrate composition, or sediment transport regime. (EA p 21). *Does not retard or prevent the attainment of ACS Objective 5.*

- Project 2 (Riparian Treatments)

  Since there would be no ground disturbance from this activity, and treatments would take place outside the stream zone, no effects to the sediment regime are expected. D*oes not retard or prevent the attainment of ACS Objective 5.*

ACS Objective 6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

Alternative 1: No Action

The current condition of in-stream flows would be maintained. *Does not retard or prevent the attainment of ACS Objective 6.*

Alternative 2: Proposed Action

- Project 1(Timber Management)

  Considering the small percentage of the watershed's coniferous forest that would be altered, the effect to base flows and peak flows is not likely to be significant or measurable (EA p. 20). The cumulative effects analysis found low sensitivity to increases in peak flows and low potential risks for aquatic resources for normal storm events (EA p. 23). *Does not retard or prevent the attainment of ACS Objective 6.*

- Project 2 (Riparian Treatments)

  This action would have no adverse effect on timing, magnitude, duration, and spatial distribution of peak, high, and low flows. *Does not retard or prevent the attainment of ACS Objective 6.*

ACS Objective 7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

Alternative 1: No Action

The current condition of floodplain inundation and water tables would be maintained. *Does not retard or prevent the attainment of ACS Objective 7.*

Alternative 2: Proposed Action:

- Project 1(Timber Management)

  The current condition of floodplain inundation and water tables would be maintained. *Does not retard or prevent the attainment of ACS Objective 7.*

- Project 2 (Riparian Treatments)

  This action would have no adverse effect on floodplain inundation and water tables. *Does not retard or prevent the attainment of ACS Objective 7.*

ACS Objective 8. Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability.

Alternative 1: No Action

The current condition of plant communities within riparian areas would be maintained. *Does not retard or prevent the attainment of ACS Objective 8.*

Alternative 2: Proposed Action

- Project 1 (Timber Management)
  The proposed action would have no adverse effects on species composition and structural diversity of plant communities in riparian areas and wetlands due to the retention of full leave Riparian Reserves. *Does not retard or prevent the attainment of ACS Objective 8.]*
- Project 2 (Riparian Treatments)
  The proposed Riparian Reserve treatments would have no adverse effects on thermal regulation, nutrient filtering, or erosional processes within riparian zones or wetlands due to the small scope of the treatments, the untreated zones along stream channels, and because no materials would be removed from the sites treated. The treatments would help to restore some structural diversity currently lacking on these sites. *Does not retard or prevent the attainment of ACS Objective 8.*

ACS Objective 9. Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.

Alternative 1: No Action

The No Action alternative would result in the continued development at the current rate with no known effect on the dependent species. *Does not retard or prevent the attainment of ACS Objective 9.*

Alternative 2: Proposed Action

- Project 1 (Timber Management)

  The proposed action would have no adverse effect on riparian dependent species. Although thinning activities may affect invertebrates within the units, adjacent non-thinned areas should provide adequate refugia for the species' and as source for repopulation (EA p.29 - 30). *Does not retard or prevent the attainment of ACS Objective 9.*

- Project 2 (Riparian Treatments)

  The proposal would be designed solely for restoring elements of structural diversity to the portions of Riparian Reserves selected for treatment. These attributes would help to provide resources currently lacking or of low quality, and over the long-term, would benefit both aquatic and terrestrial species. *Does not retard or prevent the attainment of ACS Objective 9.*

Appendix 3: Determination of Effect for Upper Willamette River steelhead trout and Upper Willamette River Chinook salmon

CHECKLIST FOR DOCUMENTING ENVIRONMENTAL BASELINE AND EFFECTS OF PROPOSED ACTION(S) ON RELEVANT INDICATORS FOR THE WILLAMETTE PROVINCE

Administrative Unit: **Salem District BLM** Basin/Section 7 Watershed: **Crabtree Creek 6th field watershed**
Project: **Roaring River Timber Sale**

Table 10: Environmental Baseline and the Effects of the Actions on Relevant Indicators

FACTORS	ENVIRONMENTAL BASELINE			EFFECTS OF THE ACTION(S)		
INDICATORS	Properly Functioning	At Risk	Not Proper. Functioning	Restore	Maintain	Degrade
Water Quality: Temperature					X	
Sediment/Turbidity					X	
Chemical Contamination/Nutrients					X	
Habitat Access: Physical Barriers					X	
Habitat Elements: Substrate					X	
Large Woody Debris (LWD)					X	
Pool Frequency					X	
Pool Quality					X	
Off-Channel Habitat					X	
Channel Condition & Dynamics: Width/Depth Ratio					X	
Streambank Condition					X	
Floodplain Connectivity					X	
Flow/Hydrology: Peak/Base Flows					X	
Drainage Network Increase					X	
Watershed Condition: Road Density & Location					X	
Disturbance History					X	
Riparian Reserves					X	

Water Quality

Temperature: Temperature in all streams would be maintained by restricting any activity within 50 feet of all streams (stream zone, SZ), full retention of Riparian Reserves (RR) along most of the streams in the project area, and minimal RR activity outside of the SZ (girdling of up to eight trees per acre on approximately 37 acres of RR). ***Effect of Action***: **'Maintains current condition'** (see Table 10).

Sediment/turbidity: The following project design criteria and site conditions are expected to prevent any increase in sediment in stream channels or any increase in stream turbidity:

- No harvest activity within RR.
- No road construction or decommissioning in any part of the proposal.
- Dry season only timber hauling.
- Slopes of less than 35% throughout the project area.
- Post-project leave tree densities of 90-120 trees per acre (tpa) throughout the project area.
- Approximate distance of 5 miles downstream from project area to ESA listed fish habitat.

Effect of Action: **'Maintains current condition'** (see Table 10).

Chemical contamination/nutrients: No activities associated with the project would increase chemical or nutrient pollution except a low probability event such as an accidental spill or vehicle accident. **'Maintains current condition'** (see Table 10).

Habitat Access

Physical Barriers: No barriers to fish migration would result from the project. ***Effect of Action***: **'Maintains current condition'** (see Table 10).

Habitat Elements

Substrate, Large Woody Debris, Pool Frequency, Pool Quality, Off-channel Habitat: No project activities would be sufficiently close to the stream channel or create enough of a disturbance to affect any of the above instream habitat elements in the streams within the project area. Additionally, the project area is approximately 5 miles upstream from any ESA listed fish habitat. ***Effect of Action***: **'Maintains current condition'** (see Table 10).

Channel Conditions and Dynamics

Width/depth ratio, Streambank Condition, Floodplain Connectivity: No project activities would be sufficiently close to the stream channel or create enough of a disturbance to affect any of the above channel conditions on stream channels within the project area. Additionally, the project area is approximately 5 miles upstream from any ESA listed fish habitat. ***Effect of Action***: **'Maintains current condition'** (see Table 10).

Flow/Hydrology

In summary, the analysis on peak flows found low sensitivity to increases in peak flows and low potential risks for aquatic resources for normal storm events. It found an "indeterminate" risk for "unusual" peak flow events associated with a 2-yr+ and greater return interval storm event.

The indeterminate rating does not require that the actions considered under this proposal be delayed or postponed. Rather, it points to the possibility of impacts to the aquatic ecosystem in these watersheds at *some point during the ten year analysis period*. In fact, the WAR analysis found that the 20% increase in a 2-yr peak flow (given as a threshold value for considering the effects of increased bed mobility and bed scour) has already been exceeded under current conditions. When public actions are separated from assumed private actions in the watershed, WAR estimated only a 0.3% increase in 2-yr + peak flows over current conditions due to the actions taken on BLM lands during the next decade. Thus, private actions alone are likely to push WAR values higher in this watershed irrespective of which alternative is chosen.

Potential peak flow increases of the amount predicted for all of the streams in the subwatershed would have no effect on ESA listed fish or their habitat located approximately 5 miles downstream of the project area. ***Effect of Action***: **'Maintains current condition'** (see Table 10).

Drainage Network Increase: There would be no changes in the road network as a result of the project since there would be no road construction or decommissioning. ***Effect of Action***: **'Maintains current condition'** (see Table 10).

Watershed Conditions

Road Density & Location: The project would result in no changes in road density. No road construction or decommissioning are proposed. ***Effect of Action***: **'Maintains current condition'** (see Table 10).

Disturbance History: The project would not result in an increased level of disturbance. Post-project stand densities would be 90-120 trees per acre; no potentially disturbing activities would occur in RR, unstable areas or refugia for sensitive aquatic species. ***Effect of Action***: **'Maintains current condition'** (see Table 10).

Riparian Reserves: The only activity occurring within RR would be the girdling/falling of up to 8 trees/acre for the purpose of creating and/or enhancing enhancing existing canopy gaps with an emphasis on releasing understory conifers and increasing snag habitat. ***Effect of Action***: **'Maintains current condition'** (see Table 10).

The project is expected to have '**no effect**' on any of the factors evaluated in Table 10., Matrix of Pathways and Indicators. The project is expected to have '**no effect**' on Upper Willamette River steelhead or Upper Willamette River chinook. The project is also expected to have '**no effect**' on Essential Fish Habitat pertaining to the Magnuson-Stevens Act.

Appendix 4: Project Design Features and Mitigation Measures By Resource

Project 1 (Timber Management)

General

Riparian Reserves: Riparian reserves in the sale area would be established to the standards for streams and wetlands outlined in the *Salem District Record of Decision (1994)* on pages C-30 and C-31. Riparian reserve boundaries would be to ecological breaks, geologically stable breaks, or the minimum slope distances on each side of the stream or wetland boundary. Reference Instruction Memorandum OR-95-75 for guidance on determination of site potential trees. Riparian Reserve widths are one site-potential tree height for non-fish bearing streams and wet areas larger than one acre. The site potential tree height for all units is 180 feet.

Soils and Water

Design features and mitigation measures for soil are implemented to retain the productive capacity of the soil by keeping it in place, keeping compaction within limits analyzed in the FEIS, and keeping an appropriate amount of organic matter in place for nutrient cycling. Design features and mitigation measures for water quality are implemented to reduce non-point source pollution to the maximum extent practicable as required by the Federal Clean Water Act (as amended by the Water Quality Act of 1987).

Ground-based Yarding:

In order to limit soil compaction and displacement to less than 10% of each unit area, conventional ground-based logging equipment would be: limited in size to a maximum of 12 feet in width; confined to designated main skid trails, which would be spaced a minimum of 150 feet apart; utilized on slopes no greater than 35%; and restricted to periods of dry or frozen soil conditions. No yarding or hauling would take place when standing water, running water, or mud is on the roads, or suspended sediment in ditches. Utilizing the above-mentioned restrictions would also minimize gouging, surface runoff, and accelerated soil erosion.

For the purpose of accommodating non-conventional ground-based equipment (such as harvester and forwarder machinery), the above-mentioned restrictions would be applicable for forwarder use, since it is the weight-bearing piece of equipment in this harvest operation. The harvester (assuming a minimum boom length of 25 feet), under dry soil conditions, does not adversely compact or displace soil. Therefore, spacing of harvester skid trails may be reduced to no closer than 60 feet apart and no wider than 12 feet. Also, more than one harvester pass over the same piece of ground may be allowed, not to exceed two passes. However, all skid trails utilized by the harvester would be covered with slash or brush (where it is available), with the slash or brush being placed in front of the machine tracks before moving the piece of equipment over it. All of the other restrictions applicable to conventional ground-based equipment would be applicable to harvester logging operations.

A logging plan specifying main skid trails and landing locations would be required prior to any harvest activity. Whenever possible, pre-existing skid trails would be reused and new skid trails would be located where they can be utilized in future harvest entries.

Main Skid Trail Blocking:

At the discretion of the Authorized Officer, the entrances to all main skid trails may be blocked with logging debris, stumps, and brush from adjacent areas immediately following timber harvest. This would reduce the likelihood of off-road vehicle damage to soils and other forest resources in this area.

Road Maintenance

- Trap or filter sediment flowing in ditches before it enters streams.
- Where practical, maintain vegetation in ditches within 200 feet of all stream crossings.
- Where ditches have been newly constructed or cleaned, place sediment traps/filtering materials in the ditch above all stream crossings.
- Natural surface roads left overwinter would require erosion control measures to prevent erosion prior to winter and may include: erosion matting, drainage modification, seeding or other appropriate techniques to prevent soil loss.
- Drainage modification may include outsloping and water bars to direct surface water onto stable forested slopes.
- Removal of live stream culverts would be restricted to low streamflow periods, and may include installation of erosion matting, shaping the streambed and banks, seeding, and other erosion control measures to prevent sediment additions to streams.
- Log hauling would be suspended during storm events if sediment traps/filtering were not adequate to minimize or prevent fine sediment delivery from the haul route to the stream system.
- Spur roads in the vicinity of the proposed timber harvest units would be cleaned up and stabilized, if needed, to maintain drainage and runoff patterns as needed to protect water quality. These roads may be blocked and/or waterbarred to prevent vehicles from disturbing the road surface and creating mud, and to minimize the likelihood of dumping, which could introduce contaminants into ground water and streams.

Other design Features

- Directional falling would be required along the haul roads to reduce the amount of logging debris along or next to the road.
- Directional falling of timber inside the unit would be required to keep tops and limbs from entering riparian reserves or adjacent private property.
- One end suspension would be required during skidding to the landing.
- Limit landings to rock roads and limit the landing size.
- Access to the sale area would be provided by BLM and Weyerhaueser controlled roads.

Vegetation

Design features and mitigation measures for vegetation are implemented to ensure the immediate and long-term sustainability of timber production by harvesting timber according to sound silvicultural principles, protecting the health of the residual timber stand after partial cut harvest. Others are implemented to maintain or enhance complex forest stand structure, develop elements of old growth and late-successional forest in the vicinity of the proposed timber harvest, and minimize potential noxious weed and invasive plant infestations.

Residual Stand Protection, Harvest Units

- In addition to seasonal restrictions to protect soil, water and wildlife resources, no falling, skidding or yarding would be allowed during the spring growing season (typically April 1 – July) when bark and cambium are easily damaged by those operations.
- Skidding and yarding techniques designed to minimize damage to residual trees would be required. Examples of potential techniques include: pre-planned skid roads, falling to lead, rub trees, etc.

Leave Trees in Thinning and Partial Cut Harvest Units

- Generally, the smaller and more deformed trees would be selected for harvest, leaving the largest and highest quality trees to continue growing and be available for future harvest.
- Some cull and deformed trees would be retained for structural diversity and potential wildlife habitat.

Late-successional Forest : Old growth trees and many of the largest second growth would be reserved from harvest in all units. They would not be felled unless essential to provide for human safety. If felled, they would be reserved as CWD.

Special Status Species: The no entry buffer for *Corydalis aquae-gelidae* is within the Riparian Reserve where no commercial thinning would take place.

Noxious Weeds and Invasive Plant Species: All earth moving equipment is to be cleaned and free of soil, brush, weeds and any part thereof before entering B.L.M. lands to prevent the spread or introduction of any noxious weed species.

Terrestrial Wildlife

Habitat Features: Where possible retain and protect all snags and down logs from falling and yarding operations.

Northern Spotted Owl

- Place a seasonal restriction from March 1 through July 15 on all felling, yarding, and loading activities to minimize the risk of disturbance to nesting spotted owls. This seasonal restriction could be waived if surveys indicate that spotted owls are not present within the disturbance range (0.25 to 0.5 miles) of the proposed units.
- Maintain dispersal habitat after harvest in unit. This can best be achieved by thinning from below and by maintaining the canopy closure at greater than 40 percent after harvest.

Mollusks: Protect the one known location of *Megomphix hemphilli* with a buffer as necessary to maintain the micro-habitat associated with the species.

Fire and Fuels

Wildfire Prevention: To minimize any human related fire starts associated with driving, create a twenty-five foot fuel reduction corridor either side of Roads # 11-1E-1.3, Rd # 10-1E-33 and Rd# 11-1E-4.1.

Other Resource Protection

- After harvest operations are completed landing debris would be piled, covered and burned, if it isn't used for blocking skid roads, etc.
- Piles would be located to minimize heat damage to tree crowns or tree boles and located within the road right-of-way as much as possible to minimize damage to the soil resource. The number of piles would be kept to a minimum to reduce the amount of soil surface area subject to heat damage.
- Burning of piles would be done in accordance with "The Oregon Smoke Management Plan". Generally speaking, piles would be burned when the surrounding vegetation and activity fuels would not support active burning at the close of a protracted east wind event. This would usually occur after November 1st of any given year.

Other

Special Forest Products (SFP)

- Following harvest of commercial timber, firewood cutters would be allowed to cut and remove firewood from landing piles.

Cultural Resources: The project complies with the August 1998 protocol for managing cultural resources on lands administered by the BLM in Oregon. If during the implementation of the project, cultural resources are found, the operations would be immediately halted and the Field Manager notified. Operations would be resumed only with the Field Manager's approval after appropriate mitigation measures were designed and implemented based on recommendations from the District Archaeologist to provide any needed protection of those resources.

Project 2 (Riparian Treatments)

Bark Beetle Prevention: Any tree falling should be accomplished between July 1 and September 30 to minimize potential bark beetle habitat (Hostetler 1996). These guidelines would be implemented where Douglas-fir is the primary choice of tree to be girdled or felled. Where western hemlock is the primary choice, the treatment may be accomplished in one operation.

Special Status Species: A 100 ft radius no entry protection buffer would be placed around the *Corydalis aquae-gelidae* (COAQ) population, and a 50 ft no entry buffer would be placed on all creeks within the project area preventing impact to the known COAQ population, any undiscovered populations or any potential habitat.

Appendix 5: Additional Images

Figure 5: 1959 Aerial Photography of the Project Area

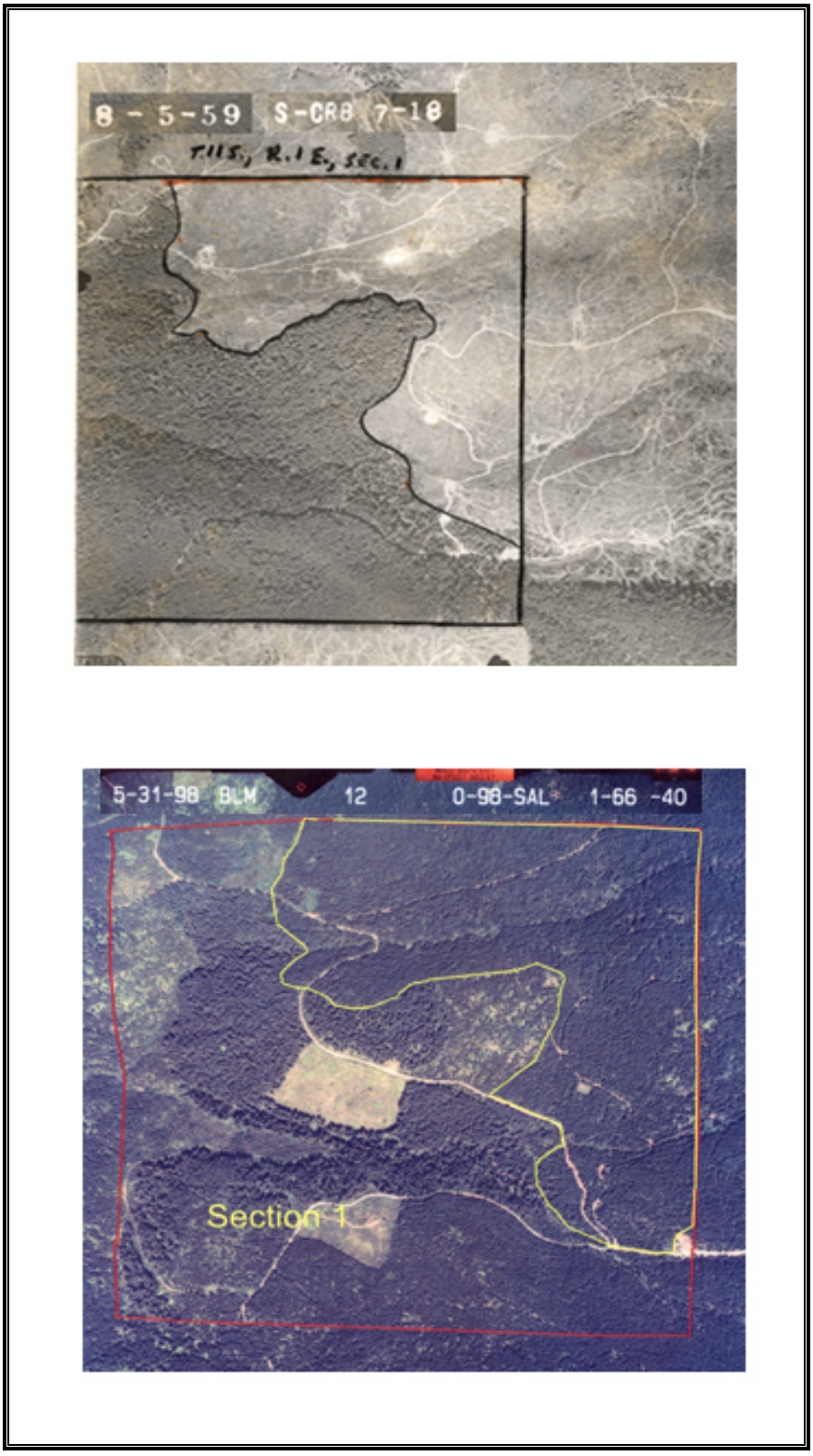

Figure 6: 1998 Aerial Photography of the Project Area